DOCUMENT RESUME

ED 116 707 IR 002 952

AUTHOR	Rogers, Everett M.; And Others
TITLE	Diffusion of Impact Innovations to University Professors. A Final Report to the Exxon Education Foundation.
INSTITUTION	Michigan Univ., Ann Arbor. Dept. of Journalism.
SPONS AGENCY	EXXON Education Foundation, New York, N.Y.
PUB DATE	Sep 75
NOTE	311p.; Some portions of document may not be readable due to irreproducibility of original; Not available in hard copy
EDRS PRICE	MF-$0.76 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Adoption (Ideas); Change Agents; College Curriculum; *College Faculty; College Instruction; College Teachers; *Diffusion; Educational Change; Educational Innovation; Educational Research; Innovation; *Instructional Innovation; Professors; *Research Projects; Surveys
IDENTIFIERS	EXPER SIM; Guided Study; *IMPACT; Student to Student Counseling; TIPS

ABSTRACT

Using four IMPACT innovations as examples (EXPER SIM, Guided Design, TIPS, and Student-to-Student Counseling), this study attempts to define the nature of technological and social changes in university teaching. Data were gathered in three phases: (1) a questionnaire was mailed to individuals who requested information; (2) the adopters of innovations were interviewed; and (3) individuals who received second-hand information were interviewed. The results of the survey focused on the primary and secondary dispersion of information, the decision making mechanism used to determine when an innovation should be adopted, the extent of adoption, and the barriers to adoption. The text of the report describes in detail the research methodology and conclusions, and the appendixes provide definitions of concepts, informational brochures about the four innovations, sample questionnaires, and coding sheets for the interviews. (EMH)

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DIFFUSION OF IMPACT INNOVATIONS
TO UNIVERSITY PROFESSORS

A Final Report to the Exxon Education Foundation

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by

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SUMMARY

The main purpose of the present research is to determine how the four IMPACT innovations (EXPER SIM, Guided Design, TIPS, and Student-to-Student Counseling) diffuse to university professors.

Data were gathered in three phases: (1) a mailed questionnaire sent to 3,058 requestors of information (as of October, 1974) about the four innovations, which, with a follow-up questionnaire and telephone interviews to a sample of non-respondents, achieved the sample equivalent of a 94 per cent response rate (as explained in Chapter 4 of this report); (2) personal and telephone interviews with 142 adopters (as of March, 1975) of the four innovations, including IMPACT program grantees (as of December, 1974, there were 55 grantees), and both pre-IMPACT and post-IMPACT spontaneous adopters (as of March, 1975, there were 208 spontaneous adopters) and intended adopters (219 intended adopters were located by March, 1975); and (3) telephone interviews with a sample of 52 secondary receivers, who were told about the four IMPACT innovations by the adopters and/or the requestors.

The four main innovations of study are:

1. EXPER SIM, a system for teaching research design through computer simulation, developed by Dr. Dana Main, Department of Psychology, University of Michigan.

2. Guided Design, a teaching method combining principles of programmed instruction with open-ended problem-solving, developed by Dr. Charles E. Wales, Director of Freshman Engineering, West Virginia University.

3. TIPS, a diagnostic tool to individualize instruction in the large class, developed by Dr. Allen C. Kelley, Department of Economics, Duke University.

4. Student-to-Student Counseling, a systematic approach to training students as academic counselors, developed by Dr. William F. Brown, Department of Education, Southwest Texas State University.

The IMPACT program was publicly launched by the Exxon Education Foundation in November, 1973, to promote these four innovations to professors and counselors in U.S. universities. Actually, 819 individuals (25 per cent of the 3,325 responding requests who were aware of the four IMPACT innovations during the first year of the IMPACT program) had been made aware prior (by activities of inventors and sub-inventors) to the first mass mailing of the IMPACT brochure.

The number of requests and the number of grant proposals submitted decreased during the later months of the IMPACT program in 1975, but the total number of requests (4,097 as of October 30, 1974) and grant applications (524 as of the third round of application in February, 1975) is nevertheless impressive. The effect of the IMPACT program is also evidenced by the fact that the number of post-IMPACT (that is, after the public launching of the IMPACT program in November, 1973) spontaneous adopters (N=178) is greater than the number of pre-IMPACT (that is, prior to November, 1973) spontaneous adopters (N=30), as of March, 1975.

Our main findings are as follows:

1. The most frequently-mentioned source/channel of information about the four IMPACT innovations was the IMPACT brochures from the Exxon Education Foundation, mentioned by 54 per cent of the responding requests.

2. The typical responding request talked with 0.92 others (secondary receivers) about an IMPACT innovation. About 49 per cent of all requests talked to at least one secondary receiver. Secondary diffusion mostly consists of information exchange about the IMPACT innovations, rather than influence flow or persuasion.

3. The typical secondary receiver talked to 1.55 tertiary receivers about the IMPACT innovations.

4. The most important reasons for non-adoption by the requests, they reported, are the unavailability of (1) funds to adopt, (2) time, and (3) specially-trained personnel, such as computer programmers.

5. The computer-dependence of EXPER SIM and TIPS may be a retarding influence on their rate of adoption, but our evidence on this point is not very strong.

6. Most of the adoption-decisions for the four IMPACT innovations may be collective (rather than individual-optional) in nature, involving colleagues, administrators, and inventors/sub-inventors. Administrators' support for the IMPACT innovations is a rather strong influence on adopters' innovation-decisions.

7. Despite considerable modification by adopters in the format, presentation, computer programs, and illustrative materials for the four IMPACT innovations, those ideas are mainly adopted with little or no expansion and/or re-invention.

8. Certain of the modifications in the four IMPACT innovations are caused by their adoption by individuals in different disciplines than those of the inventors.

9. The nature of the innovation, as well as the policy of the inventor, are factors in determining the degree to which modification, expansion, and/or re-invention of the innovation occurs.

10. Adopters are less likely to request information for more than one of the four IMPACT innovations than are other requestors.

11. Requestors tend to be in the same discipline as the inventors for each of the IMPACT innovations, but many requestors are not.

12. Teaching faculty who request information about the IMPACT innovations are about as likely to adopt as are administrators.

13. Adopters tend to be at universities with larger student enrollments than are other requests. Spontaneous adopters tend to be employed at universities with larger student enrollments than are grantee-adopters.

14. Adopters and non-adopters do not differ much on perceptions of the importance of teaching in their institutions' reward systems.

15. Gourman scores on academic quality of the institution are higher for adopters than for non-adopters of the three IMPACT teaching innovations, but the reverse is true for Student-to-Student Counseling.

16. Applicants awarded IMPACT grants are distinctive from non-grantee applicants in that they are more likely to be teaching faculty or counselors at larger-sized institutions, and in other respects.

17. The consequences of the four IMPACT innovations are generally perceived by adopters and their students as favorable, and are evaluated as advantageous when compared to traditional approaches to teaching/counseling in field experiments.

18. The perceived relative advantage of the four IMPACT innovations is positively related to their rate of adoption.

19. The college professor's need to perform as a lecturer is negatively related to the rate of adoption of the three teaching innovations.

20. An innovation's degree of compatibility with existing values, felt needs, and past experience is not strongly related to the innovation's rate of adoption.

21. Complexity has not importantly affected the rate of adoption of the four IMPACT innovations.

22. Partial adoption of the IMPACT innovations is very common, suggesting that their trialability may be related to their rate of adoption.

23. Observability is positively related to the rate of adoption of the four IMPACT innovations.

24. Almost no one has discontinued using one of the IMPACT innovations, and most adopters perceive their innovation quite favorably. However, only a few months or years of experience with one of the innovations has been gained thus far by the adopters.

RECOMMENDATIONS FOR ACTION

Seven suggestions are offered on the basis of the present research findings.

1. That ways be explored to overcome the constraints to adoption caused by the lack of (1) computer language ability, and (2) computer compatibility.
   (1) Provide a list of the present adopters of EXPER SIM and TIPS, indicating computer model and language, nature of the course in which the innovation is used, and class enrollment. This list might be included in the IMPACT brochure and/or in the inventors' mailings to requestors.*
   (2) Provide training workshops for the computer programmers who will assist the adopters in implementing the IMPACT innovations.
      (a) Provide funds to inventors and other adopters to give direct technical assistance to the computer programmers of potential adopters (something like this approach is being followed by Duke University personnel for TIPS adopters).
2. That the Exxon Education Foundation consider approaches to broadening the variety of academic disciplines presently interested in the three teaching innovations.
   (1) Provide lists to all requestors of the actual teaching materials (for example, the EXPER SIM models, TIPS exams, Guided Design projects, etc.). This approach would broaden and diversify the "invisible college" of individuals who tend to monopolize the information about the four innovations at present, and it would

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*Since the present report was drafted, one such list was prepared in October, 1975 by the Center for Research on Learning and Teaching at the University of Michigan, which indicates that EXPER SIM is being used by 76 individuals at 30 institutions or regional computing service centers on 20 different computers.

act to de-emphasize the central role of the inventor by providing wider access to information about the four innovations.

(2) To consider additional funding to present grantees and spontaneous adopters for the production of films, videotapes, filmstrip presentations, etc. about their experience with the four innovations, so as to diffuse further information about the IMPACT innovations.

(3) To consider funding or otherwise encouraging grantees and spontaneous adopters to provide training workshops and other assistance to potential adopters. This approach seeks to capitalize on the high credibility usually accorded to the satisfied adopter of an innovation.

3. To obtain and disseminate accurate data about the relative effectiveness of each of the four IMPACT innovations.

(1) To provide funds and encouragement to present adopters for evaluation studies of the effectiveness of each of the four innovations, in comparison with alternative teaching/counseling methods. Many such studies are already underway.

(2) To provide guidelines and technical assistance (perhaps from experts on evaluation) in order to improve the design and conduct of such field experiments.

4. To expand the number of grants presently awarded for each innovation.

(1) To consider giving smaller grants, perhaps ranging down to $1,000 to $2,000 to certain individuals for adopting one of the IMPACT innovations.

(2) To explore and make available information on other funding sources than the Exxon Education Foundation to potential adopters.

5. To greatly increase the number of workshop attendees, either through

holding larger-sized workshops and/or offering more workshops.

(1) To consider inviting non-applicants to workshops.

6. To especially encourage the adoption of the two computer-related innovations by computer consortia and/or networks.

7. To vary the length of the workshops, depending on the nature of the teaching/learning situation, the innovation, the number of trainees, etc.

RECOMMENDATIONS FOR FUTURE RESEARCH

The present report was written in order to present our research findings to date and to specify priorities for future analysis. Following are some of the research questions which we feel should be pursued with the data already at hand, or that could be gathered in the near future.

#1. How do the present IMPACT grantees, the spontaneous adopters, and the requestors diffuse the four innovations among their peers so as to create a corps of secondary receivers, and with what effect?

How many of the approximately 3,392 secondary receivers (estimated at present) will adopt one or more of the four IMPACT innovations during 1975-76? To what extent do these peer-to-peer dyads involving secondary receivers break outside of disciplinary-based boundaries? Of university boundaries? Do the secondary receivers further diffuse the four IMPACT innovations to "tertiary receivers"?

Our small pilot study of 52 secondary receivers in Phase III of the present study suggests that much could be learned about the in-process aspects of diffusion (1) by gathering data from a larger sample of secondary receivers so as to obtain a more adequate knowledge base, and (2) over a longer time period, when more secondary (and tertiary) diffusion will have occurred.

#2. What future adoption, and perhaps discontinuance, will occur among the 3,058 individuals who are presently requestors, grantees, and spontaneous adopters?

This issue calls for monitoring and further investigation of the in-process diffusion of the four IMPACT innovations among the respondents from whom data were originally gathered in 1974-75. How are the innovations further modified as they diffuse to others? How much discontinuance, or modification, occurs when the original grant period is completed?

#3. What is the comparative nature of the diffusion of possible further IMPACT innovations that may be selected?

If two additional innovations are included in the IMPACT program in the near future, how do their perceived characteristics affect their diffusion? This research might approach a field experimental design to the extent that the additional innovations differ from EXPER SIM, Guided Design, TIPS, and Student-to-Student Counseling in such matters as their computer-dependence, the degree of perceived need by potential adopters that they promise to meet, etc., and the various combinations of these above factors.

#4. What is the nature of local networks that seem to affect the diffusion of the four IMPACT innovations?

Our past year's research suggests the importance (1) of regional networks (such as the chemistry professors in the Wisconsin state university system who have adopted ChemTIPS), (2) of within-university networks (such as at West Virginia University for Guided Design), and (3) of within-department networks of colleagues (such as at the University of Louisville Department of Psychology, where several faculty members have adopted EXPER SIM). A small number of such locally-based networks might be selected for intensive study. Essentially, this research approach is a "micro-level" study of diffusion, which would hopefully supplement and extend our present "macro-level" understandings about diffusion. Ultimately, such micro-studies of local networks might yield data that would allow predicting (with some degree of accuracy) the communication channels through which an educational innovation would flow from one faculty member or administrator to another, and with what effect.

#5. What is the relative effectiveness of various strategies for diffusing education innovations?

The IMPACT program approach might be compared with an analysis of alternative strategies, such as (1) a low-cost, need-based information system like NEXUS, a project of the American Association for Higher Education funded by a grant from the Fund for the Improvement of Postsecondary Education, and (2) a computer-centered dissemination network like CONDUIT, a National Science Foundation-sponsored organization of eight universities that is currently engaged in exchanging computer-based instructional materials. With their permission, these, and perhaps other alternative systems, might be studied as to who they service and with what effects. The intent would be to identify particularly useful diffusion strategies, and, in a larger sense, to better understand the process of diffusion of educational innovations among university professors.

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Chapter 1

INTRODUCTION

THE RESEARCH PROBLEM

There is much concern today about how American universities are responding to the need for change in teaching and learning procedures, as a result of such environmental alterations as rising costs, more limited resources, changing student needs and interests, and the growing concern with accountability. Technological and social innovations in university teaching are available, and are constantly being invented and developed, but their diffusion and adoption by university faculty members has not yet been investigated in an adequate manner in past research. These attempts to improve university instructional programs and activities are hampered by lack of a solid basis of understanding of how innovation occurs in the U.S. university. In some respects we know much more about how such change happens among peasants in developing countries than among professors.

At the heart of such change are educational innovations, and we argue that there is considerable intellectual and pragmatic profit in studying how four selected innovations diffuse among university professors. An innovation is defined as an idea, practice, or product perceived as new by the individual or some other adopting unit* (Rogers and Shoemaker, 1971). The four IMPACT innovations selected for study in the present research project constitute a set of "tracers" which are now in the process of diffusion. The primary focus on these four innovations provides us with a specific type of data about the process of change in higher education.

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*This definition, and all others found on later pages of the present report, are listed in Appendix A.

Considerable resources have been invested in educational R & D by the Exxon Education Foundation, the National Science Foundation, the Ford Foundation, the U.S. Office of Education, the National Institute for Education, and others, in order to produce research results in the form of innovations with potential use to university faculty. But very little is presently known about how such research is utilized, about how such research-based innovations diffuse to university professors and are adopted by them. Such understanding should be of great importance to policy-makers in the field of higher education.

The theoretical framework brought to bear in the present investigation is that of the diffusion of innovations, a field of research represented by over 2,700 publications today.* This framework is described in Chapter 2 of the present report. Several hundred of these inquiries have been concerned with educational innovations, but in almost all cases the data were obtained at the elementary or secondary school level. Almost no diffusion research has been completed to date at the university level.**

Fortunately, during the time that the present research was conducted, the four IMPACT innovations, growing out of previous R & D grants by the Exxon Education Foundation, were diffusing from their originators (in all four cases, a particular university professor) to several thousand faculty members. The fact that this diffusion process was underway during our study is a special research advantage, in that data could be gathered about "diffusion-in-process," an opportunity that has not been grasped in previous diffusion researches (which are thus post hoc studies of how diffusion occurred in the recallable past).

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*These studies are synthesized, and the theoretical framework underlying them is described, in Rogers with Shoemaker (1971). The 2,700 diffusion publications are listed in a bibliography by Rogers and Thomas (1975).

**One of the few such diffusion studies is Evans' (1968) investigation of the diffusion of instructional television among university professors.

The Exxon Education Foundation is actively assisting the diffusion of the four IMPACT innovations, and these diffusion activities (such as the distribution of the IMPACT brochure packet, the training seminars for potential grantees for each of the four innovations, and the grants to selected adopters) also facilitate the present investigation in that the research almost represents a kind of field experimental situation in which various reward systems and strategies can be studied to determine their relative effectiveness in affecting the rate of diffusion. Close collaboration with the Exxon Education Foundation has been possible throughout the conduct of the present study. Such an opportunity as that represented by the present investigation has rarely been captured in previous diffusion research.

The major purpose of the present research is to determine how the four IMPACT innovations diffuse to university professors, and are adopted by them. The research results should be of use not only to the Exxon Education Foundation, in guiding its future policy decisions about educational innovation at the university level, but also more generally to those interested in educational change, and to those scholars and policy-makers concerned with the diffusion of innovations within organizational structures. Thus we see the four innovations as somewhat representative "tracers", whose diffusion in the university illuminates the nature of the change process.

The present study was directed toward providing answers to eight main research questions:

1. What communication channels are most important at the awareness-knowledge, persuasion, and decision stage in the innovation-decision process for university professors?

   Specifically, what role do various promotional activities by the Exxon Education Foundation, and by the four inventors, play in diffusion? Examples are the IMPACT mailings of the brochure/portfolio, the grantee training seminars, the advertisements in Change and other magazines, the inventors' published papers and articles, their presentations at professional meetings, and interpersonal communication among peers.

2. How do the IMPACT grantees, spontaneous adopters, and requestors communicate the four innovations through a secondary diffusion to their peers?

   What are the boundaries (and diffusion patterns) of the "invisible colleges" involved in this diffusion? For instance, is a grantee at a prestigious university more influential in the innovation-decisions of faculty at universities of similar prestige, or of less prestige? Is the grantee or spontaneous adopter at a given university especially influential for faculty at other universities of about the same size, or located in the same state? If the inventor of an IMPACT innovation is a psychologist, does the innovation tend to be adopted most rapidly by other psychologists?

3. What are the most important resistances and barriers to the diffusion and adoption of the four innovations?

   For instance, how crucial is computer make, model, and size in the university-to-university diffusion of the two IMPACT innovations that require computer use? How important is the collective nature of innovation-decisions in slowing the adoption and the diffusion of teaching innovations?

4. To what extent are the four innovations modified (such as being simplified or changed completely) in the process of their diffusion and implementation?

   How much, if at all, are the four innovations "re-invented" by adopters?

5. What are the characteristics and motivations of the IMPACT requestors, applicants, grantees, and spontaneous adopters?

   How do these categories differ from each other, and how do such differences affect the rate of diffusion?

6. What are the consequences and effects of the four innovations after their adoption by grantees and by spontaneous adopters?

   How are the innovation's advantages and disadvantages perceived by the adopter, his/her students, his/her peers, and by his/her administrators?

7. How are the four innovations perceived by faculty members, students, and administrators, and how do these perceived attributes of the innovations (such as their relative advantage over

existing practice, complexity, etc.) affect their rate of adoption?

8. What diffusion strategies (for example, financial incentives for adoption, or a special message aimed at a particular audience) might be tested in field experiments to alter the rate of diffusion of the four innovations?

The answers to these eight research questions shall constitute our present Chapter 5.

OVERVIEW OF THE PRESENT RESEARCH PROCEDURES

Here we describe briefly the main data-gathering phases in the present project (Table 1-1). These phases are then detailed later in our Chapter 4.

Phase #1: Mailed Questionnaire to Requestors

A mailed questionnaire was sent in November, 1974 to the 2,921 individuals (137 other requestors had already been interviewed) who had contacted the inventors of the four innovations to request information about the four IMPACT innovations. The identity of these individuals was obtained from the files of the four inventors, and the Exxon Education Foundation. A follow-up letter was sent in January, 1975 to the 1,026 non-respondents in the first wave questionnaire mailing; the two mailings achieved a response rate of about 72 per cent. Then we telephone-interviewed a 10 per cent sample of the 600 non-respondents to the mailed questionnaire, so as to eventually obtain a total

Table 1-1. Summary of Data-Gathering at the Three Stages of the Present Project.

Phase	Method of Data-Gathering	Intended Respondents	Requests Made by the Intended Respondents	Time of Data-Gathering
#1	Two waves of mailed questionnaires, and follow-up telephone interviews with a sample of non-respondents	2,921 * IMPACT requestors	3,960 **	November, 1974; January, 1975 and February, 1975
#2	Personal and telephone interviews with adopters	263 adopters (55 May, 1974 and October, 1974 grantees; and 208 spontaneous adopters)	--	October, 1974 to February, 1975
#3	Telephone interviews	52 secondary receiver-requestor dyads	--	April, 1975

*These 2,921 requestors do not include the 137 requestors who had been personally interviewed.

**The difference between the two figures of 2,921 and 3,960 is due to the fact that some of the requestors had requested more than one innovation. Both multiple and single requests made by the requestors were used as the unit of analysis throughout the report.

equivalent* response rate of 94 per cent (2,872 of the 3,058 requestors). The 186 "non-respondents" included 106 unusable questionnaires, and 80 requestors who could not be reached by repeated telephone calls.

Phase #2: Personal Interviews with Adopters

We interviewed either personally or by telephone all of the 55 grantees who were awarded grants in May, 1974 and in October, 1974; and a sample of 65 of the 208 spontaneous adopters, including pre-IMPACT (N=29) and post-IMPACT (N=36) spontaneous adopters.

Phase #3: Interviews with Secondary Receivers

Data were gathered in April, 1975 from a sample of the 52 "secondary receiver-requestor dyads" who were told about the four IMPACT innovations by the adopters and/or the requestors, to determine the nature of the secondary diffusion process.

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*As is explained in Chapter 4, the 52 respondents in the 10 per cent telephone sample were each weighted by a factor of 10 to yield 520 "respondents."

Chapter 2

MAIN ELEMENTS IN THE DIFFUSION OF INNOVATIONS

The purpose of this chapter is to briefly summarize the four main elements in the diffusion of innovations, the theoretical framework that guided the present investigation of the four IMPACT innovations. This framework has come to be called the "classical diffusion model"; a detailed statement is provided by Rogers with Shoemaker (1971), which we summarize here. Certain modifications must be made in this model to suit it to the particular conditions of the diffusion of the four IMPACT innovations among university professors in the United States.

The study of the diffusion of new ideas began in the late 1930's when sociologists investigated the spread of hybrid seed corn from agricultural scientists to Iowa farmers. Today, 2,700 research publications later, we understand a great deal more about the way in which new ideas spread among such varied audiences as medical doctors, Colombian peasants, suburban housewives, industrial plant managers, and Australian aborigines.

Central to the investigation of diffusion are four key elements: (1) an innovation, (2) communicated via certain channels, (3) to members of a social system, (4) who adopt it over a period of time.

THE INNOVATION

An innovation is an idea, practice, or object perceived as new by an individual or some other adopting unit (Rogers with Shoemaker, 1971).

It matters little, as far as human behavior is concerned, whether or not an idea is "objectively" new as measured by the lapse of time since its first use or discovery. The perceived newness of the idea for the individual determines his/her reaction to it. If the idea seems new and different to the individual, it is an innovation.

Newness in an innovation need not just involve new knowledge. Someone may have known about an innovation for some time, but not yet developed a favorable or unfavorable attitude toward it, nor have adopted or rejected it. The "newness" aspect of an innovation may be defined in terms of knowledge, attitude, or a decision to adopt.

To assume that all innovations are equivalent units of analysis is a gross over-simplification. An educational innovation like modern math may take only five or six years to completely diffuse among public schools, while another innovation like team teaching may require several decades to reach widespread use. An innovation's characteristics as perceived by its potential users will affect its rate of adoption. Five attributes frequently studied are: (1) relative advantage, the degree to which an innovation is perceived to be superior to the existing practice that it supercedes, (2) compatibility, the degree to which an innovation is perceived as consistent with the existing values, felt needs, and past experience of the individual, (3) complexity, the degree to which an innovation is perceived as relatively difficult to adopt and requiring some special skills and facilities for adoption, (4) trialability, the degree to which an innovation may be experimented with on a limited basis, and (5) observability, the degree to which the results of an innovation are visible to others. These are not the only qualities of an innovation which affect its rate of adoption, but past research indicates they are the most important.

COMMUNICATION CHANNELS

Communication is the process by which messages are transmitted from a source to a receiver, with the intent to affect the receiver's behavior. A communication channel is the means by which the message gets from the source to the receiver.

The essence of the diffusion process is the interaction by which one person communicates a new idea to one or several other persons. At its most elementary form, the process involves (1) a new idea, (2) an individual who knows about the innovation, (3) another individual who does not yet know about it, and (4) a communication channel connecting the two individuals. The nature of the social relationship between the source and the receiver determines the conditions under which a source will or will not tell the receiver about the innovation, and further, it influences the effect of the telling.

The communication channel by which the new idea reaches the receiver affects his decision to adopt or reject the innovation. The source usually chooses the communication channel for an innovation on the basis of which channel will be most effective in reaching his audience. If he/she simply wishes to inform receivers about the innovation, mass media channels are often most rapid and efficient, especially for a large audience. If, on the other hand, the source wishes to persuade the receiver to form a favorable attitude toward the innovation, an interpersonal channel is more likely to be effective. Interpersonal channels involve a face-to-face exchange between two or more individuals.

The source, then, on the basis of these previous research findings, should choose between mass media and interpersonal channels on the basis of the receiver's stage in the innovation-decision process.

OVER TIME

Time is one of the most important considerations in the process of diffusion. The time dimension is involved in the innovation-decision process, in the relative innovativeness of the individual, and in the innovation's rate of adoption in the social system.

The Innovation-Decision Process

The innovation-decision process is the mental process through which an individual progresses from initial awareness of an innovation to a decision to adopt or reject, and finally to confirmation of this decision. We conceptualize four main functions in the process: (1) knowledge, (2) persuasion (attitude formation and change), (3) decision (adoption or rejection), and (4) confirmation. These stages usually, but not always, occur in this sequence (Figure 2-1).

The innovation-decision process can take a negative turn; that is, the final decision can be to reject rather than to adopt the innovation. Also, another decision can be made after the adoption decision to discontinue use

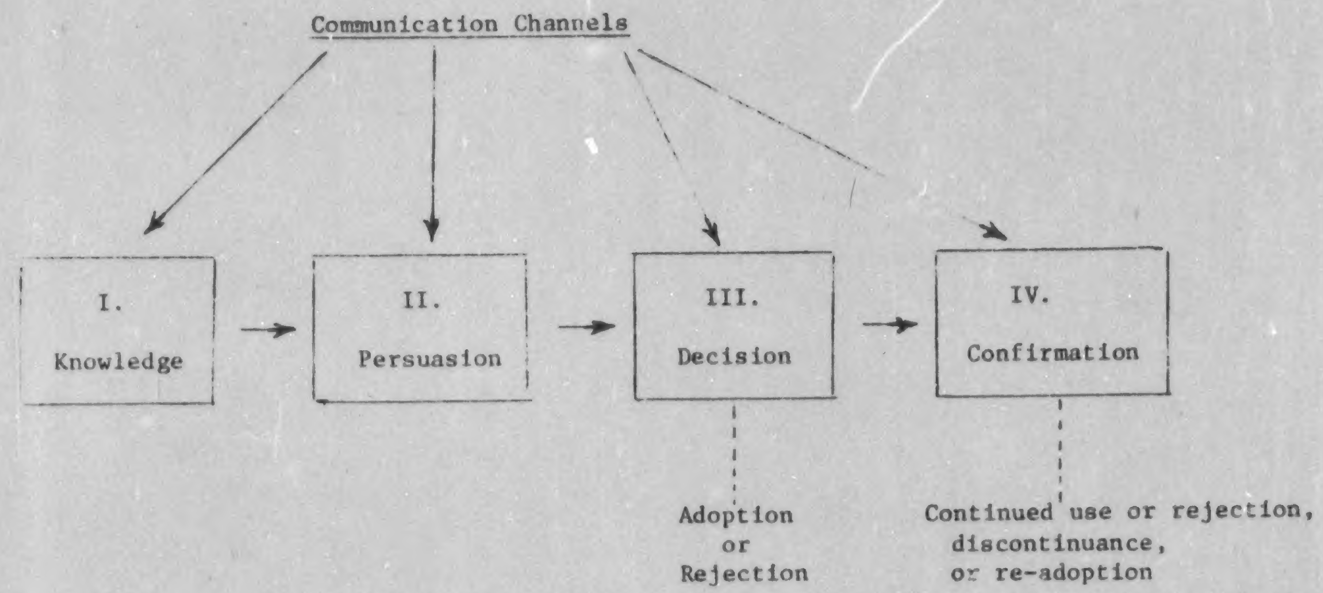

Communication Channels
I. Knowledge
II. Persuasion
III. Decision
IV. Confirmation
Adoption or Rejection
Continued use or rejection, discontinuance, or re-adoption

Figure 2-1. Paradigm of the Four Functions in the Innovation-Decision Process.

of the innovation. The last step in the process is confirmation, the stage at which the receiver seeks reinforcement for the adoption or rejection decision he has made. Occasionally contradictory messages about the innovation reach the receiver, leading to discontinuance after prior adoption, or to adoption after previous rejection.

Innovativeness and Adopter Categories

Innovativeness is the degree to which an individual is relatively earlier in adopting new ideas than other members of his/her social system (Rogers with Shoemaker, 1971). The five adopter categories are: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. It is often useful to refer to a particular individual as being in one of the five adopter categories, for diffusion research shows that members of each adopter category have a great deal in common. If a receiver is like most others in the late majority category, he/she is below-average in social status, has little use of mass media channels, and receives most of his/her new ideas from peers via interpersonal channels. In contrast, innovators usually travel widely, possess slack resources, and enjoy trying out new ideas.

Obviously, the measure of innovativeness and the classification of the system's members into adopter categories are based upon the relative time at which an innovation is adopted.

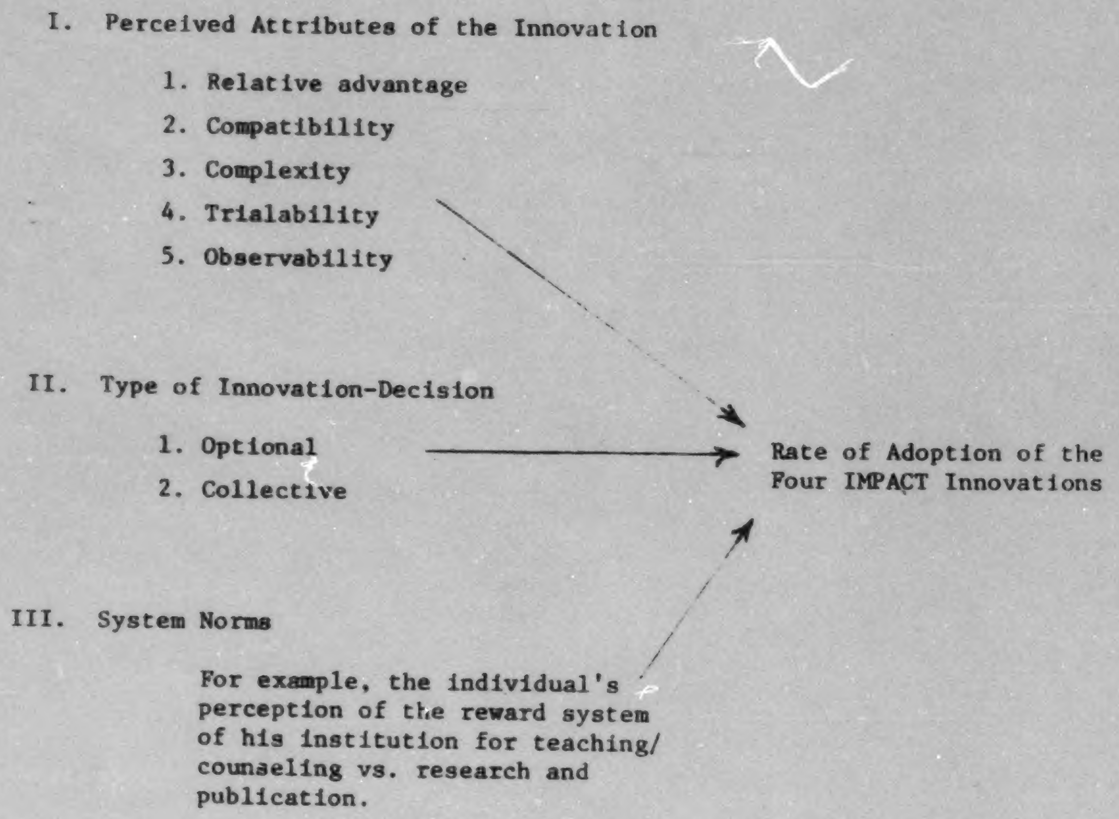
Rate of Adoption

A third way that the time dimension relates to diffusion involves an innovation's rate of adoption, the relative speed with which it is adopted by members of a social system. This rate is usually measured by the time required for a certain percentage of the system members to adopt an innovation, so the adoption rate is measured for an innovation or a system rather than an individual. Innovations that are perceived by receivers as having greater relative advantage, compatibility, etc. usually have a faster rate of adoption than others (Figure 2-2).

TO MEMBERS OF A SOCIAL SYSTEM

Adoption rates are often different for the same innovation in different social systems. A social system is a group of individuals, or units, who are functionally differentiated and engaged in collective problem-solving with respect to a common goal. The members of a social system may be individuals, informal groups, complex organizations, or sub-systems. The social system analyzed in a diffusion study may consist of all the peasants in a Latin American village, farmers of an Ohio county, professors in a university, or members of an aborigine tribe. All members cooperate to the extent of seeking to solve a common problem or reach a mutual goal, and this sharing of an objective helps bind the system together.

The social system is important, as its structure affects the innovation's diffusion patterns in several ways. Here we will discuss how the social structure affects diffusion, the roles of opinion leaders and change agents, and, finally, types of innovation-decisions.



I. Perceived Attributes of the Innovation

1. Relative advantage
2. Compatibility
3. Complexity
4. Trialability
5. Observability

II. Type of Innovation-Decision

1. Optional
2. Collective

III. System Norms

For example, the individual's perception of the reward system of his institution for teaching/counseling vs. research and publication.

Rate of Adoption of the Four IMPACT Innovations

Figure 2-2. Paradigm of Variables Related to the Rate of Adoption of the Four IMPACT Innovations.

Opinion Leaders and Change Agents

Very often the most innovative member of a system is perceived as a deviant from the social system, and he/she is accorded a somewhat dubious status and low credibility. His/her role in diffusion, especially in persuading others of the innovation, is therefore likely to be limited. On the other hand, there are members of the system who function in the role of opinion leader, providing others in the system with information and advice about innovations.

Opinion leadership is the ability to informally influence attitudes and/or overt behavior of others in a desired way with relative frequency. Thus it is a type of informal leadership, rather than a function of the individual's formal position or status in the system.

Opinion leaders are usually members of the social system which they influence. In some instances, individuals with influence in the social system are professionals who represent external change agencies. A change agent is a professional who influences innovation-decisions of individuals in a direction deemed desirable by a change agency. He/she usually seeks to have new ideas adopted, but he/she may also attempt to slow down diffusion and prevent the adoption of undesirable innovations. Change agents often use opinion leaders in a social system to prime the pump of planned change. There is research evidence that opinion leaders can be "worn out" by change agents who over-use them. Opinion leaders may be perceived by their peers as too much like the change agents, and thus lose credibility with their former followers.

Types of Innovation-Decisions

The social system has yet another important kind of influence on the diffusion of new ideas. The adoption or rejection of innovations by individual members of a social system may be influenced to some degree by the system. The relationships between the social system and the decision to adopt an innovation may be categorized in three ways.

1. *Optional innovation-decisions* are made by an individual regardless of the decisions of other members of the system. Even in this case, the individual's decision is undoubtedly influenced by the norms of his social system and by his need to conform to group pressures. The decision of an individual to begin wearing contact lenses instead of eye glasses, an Iowa farmer's decision to adopt hybrid corn, and the adoption of contraceptive pills are examples of optional decisions. Some of the decisions to adopt the four IMPACT innovations that we report in the present publication are optional in nature, made by the individual professor or counselor, but most are not.

2. *Collective innovation-decisions* are made by consensus among individuals in the social system. All must conform to the system's decision once it is made. An example is fluoridation of a city's drinking water; once the community decision is made, the individual has little practical choice but to use fluoridated water. We find in this report that Student-to-Student Counseling is more likely to be a collective decision, made by a number of counselors, than are the three

teaching innovations that we study. For all four IMPACT innovations, collective decisions are more common than are optional decisions.

3. Authority innovation-decisions are forced upon an individual by someone in a superior power position (such as a supervisor in a formal organization). The individual's attitude toward the innovation is not the prime force in his/her adoption or rejection; he/she is simply told of, and expected to comply with, the innovation-decision. Few research studies have been conducted of this type of innovation-decision, which must be very common in an organizational society such as the U.S. today. We occasionally encountered an authority decision for the IMPACT innovations, when an administrator made the innovation-decision and then ordered his faculty or staff to adopt.

In the present investigation, we have some practical difficulty in distinguishing between collective and authority decisions, and hence we usually just refer to "collective decisions".

Generally, fastest adoption rates are by authority decisions (depending, of course, on whether the authorities in question are innovative or not). Optional decisions usually can be made more rapidly than collective decisions. Although made most rapidly, authority decisions are more likely than others to be circumvented; and they may lead to a high rate of eventual discontinuation of the innovation.

System Norms

A norm is the established behavior pattern for the members of a given social system (Rogers with Shoemaker, 1971, pp. 30-31). Certain norms favor innovation while other norms tend to discourage individual members of a system from adopting.

For instance, in the present study, we investigated how a university unit's (such as a department's) norms on the importance of teaching versus research and publication act to facilitate or retard the adoption of the four IMPACT innovations.

IMPLICATIONS FOR THE PRESENT STUDY

The so-called classical diffusion model and recent modifications in it have direct relevance for studies of educational innovation in general, and, more specifically, for study of the individual-in-organization as an adopter of innovations.

In the present research, we study college professors/counselors who are members of organizations, and who are not isolated islands. Most previous diffusion studies focused on individuals largely free of social system effects, that is, on optional innovation-decisions. We find in our later chapters that the adopters of the IMPACT innovations are often influenced by their administrators, and many of our respondents, in fact, are administrators. The availability of slack resources, faculty release time, etc. represent potential powers that higher administrators have over our respondents, and thus these superiors may exert influence on the rate of adoption of the IMPACT innovations. The reward system of the institution also influences the innovative behavior of our college professor respondents. In numerous other ways, the organization is involved in the innovation diffusion processes described herein (Rogers and Agarwala-Rogers, in press).

So while we generally take the diffusion of innovation framework (as described previously in the present chapter) as our point of departure in the present investigation, our future chapters will show that considerable modification must be made in this theoretical paradigm so that it is more appropriate to the behavior we seek to analyze.

Chapter 3

THE IMPACT PROGRAM AND THE FOUR INNOVATIONS

The purpose of this chapter is to briefly describe (1) the historical background of each of the four IMPACT innovations, and (2) the IMPACT program of the Exxon Education Foundation that was conducted in order to diffuse these four innovations to university professors. We begin with a description of EXPER SIM, one of the four IMPACT innovations.

EXPER SIM

EXPER SIM ("experimental simulation") is a system for teaching research design and strategy through computer simulation. It offers an effective and economical way around the shortcomings and problems of the traditional laboratory experience. EXPER SIM facilitates the teaching of research methods by enabling students to run experiments on a computer which has been programmed to generate relevant data. The computer replaces the actual data-collection, thus saving time and eliminating the need for expensive laboratory space, equipment, and direction from teaching staff. Students are required to design research experiments and strategies, and perform their own analyses of the data obtained from the computer.

EXPER SIM was originally developed to aid in teaching undergraduate students the research procedures and problems of psychology. EXPER SIM was designed for use in Psychology 210 at the University of Michigan by Dr. Dana Main.* During the regular academic year, about 20 sections of this course are offered at the University of Michigan; each section has about 14 students enrolled. The course is staffed by a faculty member (Professor Main) and several graduate teaching fellows, who teach the sections. Class assignments and activities in Psychology 210 consist of readings from elementary research textbooks, procedures for conducting in-class and out-of-class experiments, preparation of journal-type papers, discussions, lectures, and examinations, field trips to local laboratories, films, and a final experiment which the student plans, executes, and records.

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*In September, 1975, Dr. Main became Associate Professor at the West Virginia College of Graduate Studies, Charleston, West Virginia.

In pre-EXPER SIM days, Psychology 210 students usually worked in "rat labs" and/or with human subjects. Neither was satisfactory, as most of the course was devoted to data-gathering, leaving little time and effort for learning the broader concepts and process of research design. Similar problems in teaching the undergraduate-level course in experimental design also existed at other universities.

In the spring of 1970, Dr. Richard R. Johnson of the Department of Psychology at Earlham College visited his alma mater, the University of Michigan, to discuss his experiences in developing a computer simulation of an experiment for his course in psychological experimentation developed in 1968. In Johnson's simulation, termed "DATA-CALL," the student was informed of a research problem, and provided with a set of manipulatable variables. He/she generated an hypothesis and tested it by examining the relationships among certain variables while holding others constant as controls; finally, he/she was presented with a set of computer-generated data based on his/her research design decisions. Johnson's program consisted of a set of data-generating algorithms. The student was free to run a number of experiments, being provided with a realistic exercise in sequential research design decisions.

Subsequently, Professor Jerry Kissler at Washington State University in 1970 also developed and tested a computer simulation for use in his experimental psychology courses known as "LAB SIM," which was influenced by DATA-CALL.

Based on Johnson's work, some of the teaching staff of Psychology 210 at the University of Michigan began to develop a comparable simulation program in 1970, which is now known as "EXPER SIM." The computer program was written by Sabin Head and Bob Stout; scenarios were written by David Malin, Susan Mueller, and D.W. Rajecki; and an assessment of the impact of the simulation in the form of a course-wide testing program was developed by Steve Doehrman, Nan Holmes, and Professor Main. At the Dartmouth Conference on Computers in the Undergraduate Curriculum (CCUC) in 1970, Dana Main reported the first year's experience with EXPER SIM at the University of Michigan. Richard Johnson was also present, and reported his experience with DATA-CALL (Johnson, 1971). Both presentations created interest among certain of the participants. Art Cromer, a faculty member at the University of Louisville, started working on a similar computer program in 1971 for his Psychology 311 course, along with his colleague, John B. Thurmond, a psychology professor. EXPER SIM is used in about 22 sections (of about 20 students each) of the experimental psychology course at Louisville. The Louisville version of EXPER SIM has played an important role in the diffusion of EXPER SIM, as it better suits the smaller capacity computers at many universities. Art Cromer has written all of Michigan's EXPER SIM models* in BASIC computer language, as well as all of the Louisville EXPER SIM models in Fortran language. Most of the labor and computer costs for this development work on

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*A "model" in the sense of EXPER SIM is a problem set of hypothetical or real-life data.

EXPER SIM have been contributed by Art Cromer and by the University of Louisville computer center. In addition, the following financial support has been received.

1.	University of Louisville Greater Quality Program (funds were provided to purchase teletypes), 1974	$2,700.00
2.	Exxon Education Foundation, 1974-1975	5,000.00
3.	The sale of approximately 40-45 program packets to individual requestors	300.00
	Total	$8,000.00

Dana Main received a total of $18,000 for the entire period that EXPER SIM was going through various developmental stages at the University of Michigan. The various sources of these funds are:

1.	Exxon Education Foundation, 1973	$ 9,000.00
2.	Center for Research on Learning and Teaching, University of Michigan, 1973-1974 (for dissemination of EXPER SIM)	4,000.00
3.	Exxon Education Foundation, 1974 (for documentation and programming of EXPER SIM)	5,000.00
	Total	$18,000.00

In the summer of 1971, Charles E. Hallenbeck at the University of Kansas developed a program similar to EXPER SIM, named "KUSIM." He was influenced by Johnson's DATA-CALL and Main's EXPER SIM, but he had already developed KUSIM by the time he learned all the details about these other approaches. KUSIM has been running without error since March, 1973.

Douglas Lowry at the Michigan Institute of Technology developed "SIMPAC" for his experimental methodology course, based somewhat on Kissler's LAB SIM at Washington State University.

Although many individuals were developing various forms of DATA-CALL during the 1970-73 period, Dana Main at the University of Michigan and Art Cromer at the University of Louisville were perhaps most vigorous in the further development of EXPER SIM. Papers on the results (Main, 1972) were read at professional conferences and subsequently published.

In the spring of 1972, Richard Johnson moved to the Exxon Education Foundation in New York as Program Manager of the Educational Research and Development Program.

The second CCUC took place in June, 1972 with further papers about EXPER SIM. James Ullrich of the University of Montana met both Richard Johnson and Dana Main at this conference, and then proceeded to develop an EXPER SIM program for the DEC System 10, a smaller-sized computer found at many undergraduate teaching colleges.

Figure 3-1 shows the various versions of computer simulation models like EXPER SIM that were developed after DATA-CALL in 1968. The computer program for EXPER SIM at the University of Michigan is titled "MESS" (for "Michigan Experimental Simulation Supervisor"), and the program at the University of Louisville is called "LESS" (for "Louisville Experimental Simulation Supervisor"). Philip Spelt of Wabash College modified LESS to fit his computer

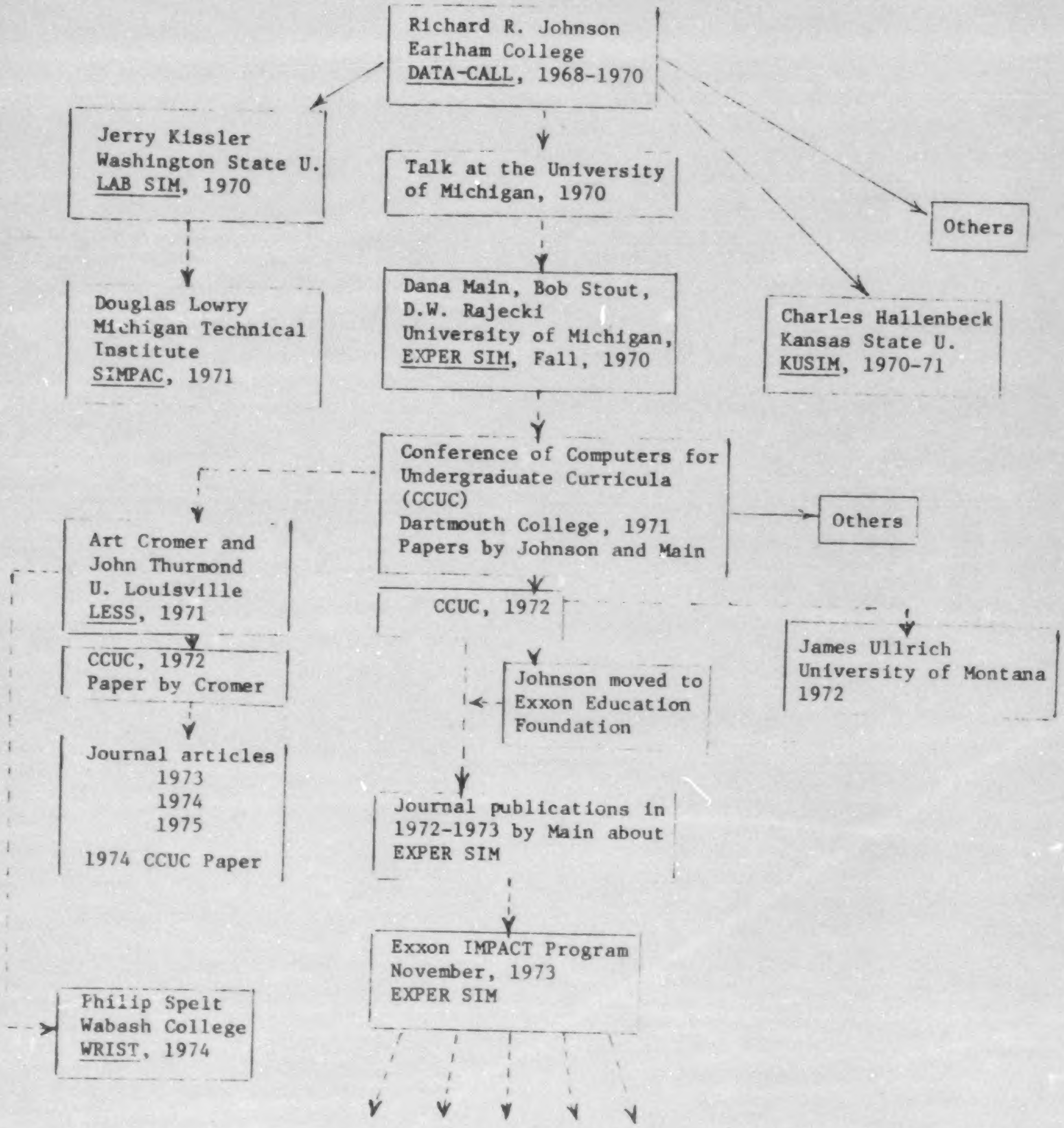
Richard R. Johnson
Earlham College
DATA-CALL, 1968-1970
Jerry Kissler
Washington State U.
LAB SIM, 1970
Talk at the University
of Michigan, 1970
Others
Douglas Lowry
Michigan Technical
Institute
SIMPAC, 1971
Dana Main, Bob Stout,
D.W. Rajecki
University of Michigan,
EXPER SIM, Fall, 1970
Charles Hallenbeck
Kansas State U.
KUSIM, 1970-71
Conference of Computers for
Undergraduate Curricula
(CCUC)
Dartmouth College, 1971
Papers by Johnson and Main
Others
Art Cromer and
John Thurmond
U. Louisville
LESS, 1971
CCUC, 1972
James Ullrich
University of Montana
1972
CCUC, 1972
Paper by Cromer
Johnson moved to
Exxon Education
Foundation
Journal articles
1973
1974
1975
1974 CCUC Paper
Journal publications in
1972-1973 by Main about
EXPER SIM
Exxon IMPACT Program
November, 1973
EXPER SIM
Philip Spelt
Wabash College
WRIST, 1974

Figure 3-1. Evolution of the Idea of DATA-CALL, EXPER SIM, and Their Various Off-Shoots.

system (a DEC 11/45). "WRIST" ("Wabash Research Investigation Simulation Teacher") is now being diffused to colleges with smaller computers.

In 1973, EXPER SIM at the University of Michigan was selected by the Exxon Education Foundation for inclusion as one of the four innovations in the IMPACT program.

Various evaluation studies are available about the effectiveness of EXPER SIM in teaching experimental design. Main and Nussloch (1975) compared the effectiveness of two pedagogies in teaching students about the psychological phenomenon of imprinting. The method of journal critiquing was compared to EXPER SIM which was found to be a more effective method of teaching.

Arthur Cromer and John Thurmond (Undated) substantiated these findings. They found that:

1. Typically, by the end of a semester's exposure to EXPER SIM, students demonstrate a preference for self-designed experiments.
2. Given a complete problem description and unspecified variables, students are discouraged from randomly manipulating the variables, and must learn to think like a researcher.
3. Instructors perceive EXPER SIM as facilitating and stimulating class sessions and thereby improving their teaching effectiveness.

GUIDED DESIGN

Guided Design is a combination of self-study of subject matter and guided decision-making in solving open-ended real world problems (Duggal, 1974).

Guided Design revolves around students' efforts to devise solutions for a series of open-ended problems. They typically work in small groups, attacking problems rather than memorizing masses of sterile information. While there is usually no single correct answer to the problems, each requires the student to put into play certain kinds of information and skills. The professor selects the problems surrounding the content and skills he/she wants the student to learn. The manner in which students deal with the problems is programmed in sequential steps. Students deal with each stage in the problem, usually in small classroom groups of from four to seven; as a group they devise a plan for tackling each stage of the problem.

Some of the component characteristics of Guided Design can also be found in other instructional systems. Self-study of subject matter, for example, is now used as part of many instructional systems, and individualized instruction is becoming increasingly popular. Group discussion by students in arriving at a decision is sometimes found in a particular course or an instructional system. A structured seminar may be used instead of a lecture as a method of instruction. Design projects are found in various courses. However, it is possible to isolate Guided Design from these other modes of instruction because it integrates the study of the subject matter with decision-making which makes use of what is learned.

Professor Charles Wales is the Director of Freshman Engineering and Professor of Engineering and Education at West Virginia University. Dissatisfied with "conventional" teaching methods which place emphasis primarily on information-acquisition, Wales began to drift away from the standard lecture-based teaching widely used in engineering education. In the early 1960's he developed programmed instruction self-study materials for a sophomore class which allowed him to use class time to discuss open-ended questions. This approach later was to become "Guided Design," a method of education combining self-study with decision-making. Wales experimented with the Keller Plan and various other forms of self-study in his Guided Design system. Wales used Guided Design in his engineering classes in 1969 for the first time, and gathered detailed data on the changes in rates of student learning caused by Guided Design. A booklet entitled Educational System Design was published by Wales and his co-worker, Robert Stager, in 1970. Between 1970 and 1974, Wales gave 35 workshops on Guided Design to various audiences. He was the main fountainhead of energy, enthusiasm, and diffusion of Guided Design prior to the IMPACT program. Since the inclusion of Guided Design in the IMPACT program in November, 1973, Wales' efforts to promote Guided Design as a teaching innovation have been further expanded.

Wales received a grant from the Exxon Education Foundation in 1965 when he first developed the basic idea for Guided Design (Figure 3-2). He received an R & D grant from the Exxon Education Foundation in 1969 to facilitate the implementation of Guided Design. In 1970, the Department of Chemical Engineering at West Virginia University was awarded an Exxon Education Foundation grant for a three-year project to further Guided Design. Since 1971 Wales has also received two smaller grants from the Alcoa Aluminum Company.

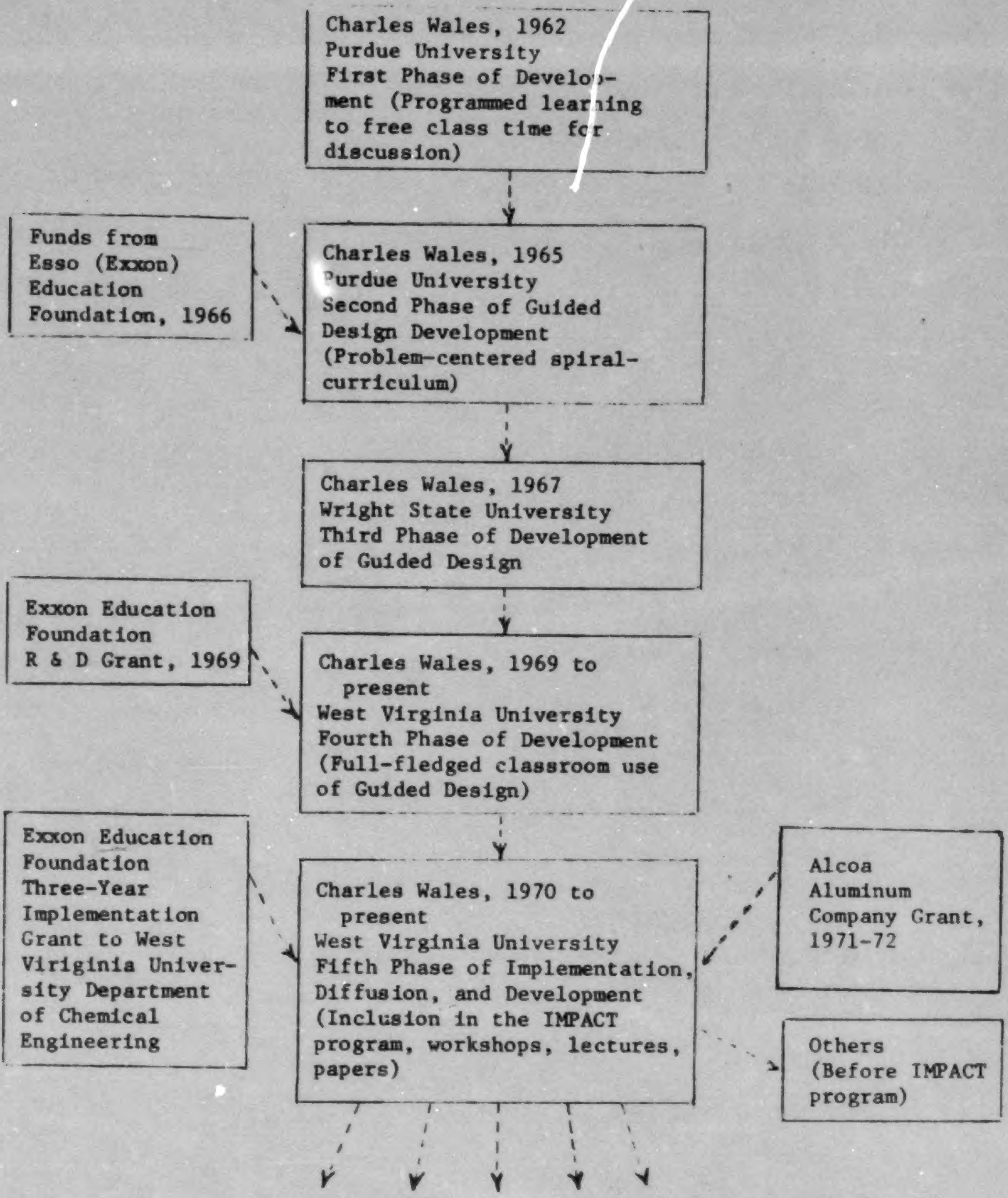
Charles Wales, 1962 Purdue University First Phase of Development (Programmed learning to free class time for discussion)
Funds from Esso (Exxon) Education Foundation, 1966
Charles Wales, 1965 Purdue University Second Phase of Guided Design Development (Problem-centered spiral-curriculum)
Charles Wales, 1967 Wright State University Third Phase of Development of Guided Design
Exxon Education Foundation R & D Grant, 1969
Charles Wales, 1969 to present West Virginia University Fourth Phase of Development (Full-fledged classroom use of Guided Design)
Exxon Education Foundation Three-Year Implementation Grant to West Viriginia University Department of Chemical Engineering
Charles Wales, 1970 to present West Virginia University Fifth Phase of Implementation, Diffusion, and Development (Inclusion in the IMPACT program, workshops, lectures, papers)
Alcoa Aluminum Company Grant, 1971-72
Others (Before IMPACT program)

Figure 3-2. Evolution of Guided Design.

1.	Esso (Exxon) Education Foundation, 1966-1967 (for experimentation leading to Guided Design)	$ 8,000.00
2.	Exxon Education Foundation, 1969 (an R & D grant for Guided Design)	23,300.00
3.	Exxon Education Foundation, 1970-1973 (a grant to the University of West Virginia Department of Chemical Engineering for further development and implementation of Guided Design)	100,000.00
4.	Alcoa Aluminum Company, 1971-1972 (for implementation and dissemination of Guided Design)	15,000.00
	Total	$146,300.00

Robert Stager and Gene D'Amour, former and present colleagues at West Virginia University, respectively, are credited by Charles Wales for their efforts to help develop and spread the implementation of Guided Design. There are no apparent sub-inventors, although spontaneous adopters of Guided Design seem to act as sub-centers of development, implementation, and diffusion of the innovation.

Charles Wales has made several attempts to evaluate Guided Design in comparison with the usual lecture-based approach to teaching large classes. Wales claims that Guided Design deals with three types of goals: (1) *knowledge* of concepts and principles, (2) the recognition and responsiveness to *values*, and (3) *decision-making* in a creative and humane fashion. Wales argues that the lecture-based method heavily emphasizes only the knowledge goal, and neglects the other two.

In an analysis of the performance of students in the undergraduate chemical engineering program at West Virginia University before and after the implementation of Guided Design, Wales found that grade point averages improved significantly. The overall impact of this teaching method is indicated by the finding that students exposed to Guided Design have also improved their work in other courses.

TIPS

TIPS ("Teaching Information Processing System") is a computer-assisted method of monitoring each individual student's progress, identifying specific weaknesses and strengths in grasp of the subject matter, and of prescribing corrective study activities. Every week or so, students take ten- to fifteen-minute multiple-choice "surveys" which are geared toward measuring the student's grasp of the course contents. The surveys are not utilized as part of the course grading system. Their purpose is to diagnose students' difficulties and help them rectify deficiencies related to the course.

TIPS "is a testing and evaluation system which provides the capability of increasing the level of individualized instruction in a classroom" (Kelley, 1968 and 1970). TIPS is designed to process performance information in order to provide feedback to each individual student on his/her comprehension and understanding of concepts in a given course. The varied pace of students' learning and the wide dispersion of their abilities often makes the professor's teaching task very difficult in a large classroom situation. Hence, TIPS helps by providing an individualized type of instruction in a large classroom where one-to-one interaction is otherwise infeasible. TIPS seeks to create good study habits by continuously measuring student performance and by providing rapid feedback.

Dr. Allen C. Kelley is Professor and Chairman of the Department of Economics at Duke University, in Durham, North Carolina. TIPS was his answer to large, impersonalized, and diversified introductory classes in principles of economics at the University of Wisconsin-Madison campus, where TIPS was first conceived and used in Kelley's classroom in Fall, 1966.

During the period from 1966 to 1967 a field-testing exercise for TIPS was conducted. This experimentation with TIPS was aimed at obtaining students' reactions and feedback about the new method of teaching. Data and experience from this developmental-experimental phase were presented in an article in the American Economic Review (Kelley, 1968).

His findings, based on the 278 students who were enrolled, indicated that TIPS was a relatively low-cost method of teaching (averaging about $1.00 per student per semester); student fear of the computer was not a deterring factor; student retention of course contents was greater when using TIPS; and TIPS proved to be a motivational, individualized instruction device.

The second controlled experiment on the effectiveness of TIPS began in 1970-71. Kelley (1972) found no significant differences between the per student cost of using TIPS versus a lecture approach. However, student achievement, as measured by course exam scores, was greatest for the relatively low-achieving student.

Kelley moved to Duke University in Fall, 1972, but he continued experimenting with TIPS, modifying the user's guide and trying to make TIPS more useable.

Kelley's initial source of funds (for 1966-68) was from the University of Wisconsin-Madison, where he obtained funds from a Carnegie Foundation grant to Articulated Instructional Media in the School of Letters and Sciences, and the Graduate School. In 1968 Kelley received a grant from the Exxon Educational Foundation to undertake a research evaluation of TIPS. The total funds spent on TIPS before Kelley moved to Duke University were about $120,000, excluding free computer time contributed by the University of Wisconsin-Madison. Presently, Dr. Kelley has an Exxon Education Foundation grant to continue the development of TIPS, and to disseminate his materials about it.

Dr. Bassam Shakhashiri of the Department of Chemistry at the University of Wisconsin-Madison, adopted Kelley's TIPS program to an application in teaching chemistry that he calls "ChemTIPS". We consider Dr. Shakhashiri a spontaneous adopter (Figure 3-3) who has played an especially important role in giving visibility to the innovation in the chemistry field.

TIPS is often compared to a set of teaching aids known as CMI (Computer Mediated Instruction) and has some aspects of self-paced instruction, which is also referred to as a "personalized system of instruction" (PSI). A common type of PSI is known as the "Keller Plan," originally developed by Professor Fred Keller of Arizona State University (Keller, 1968). The Keller Plan is

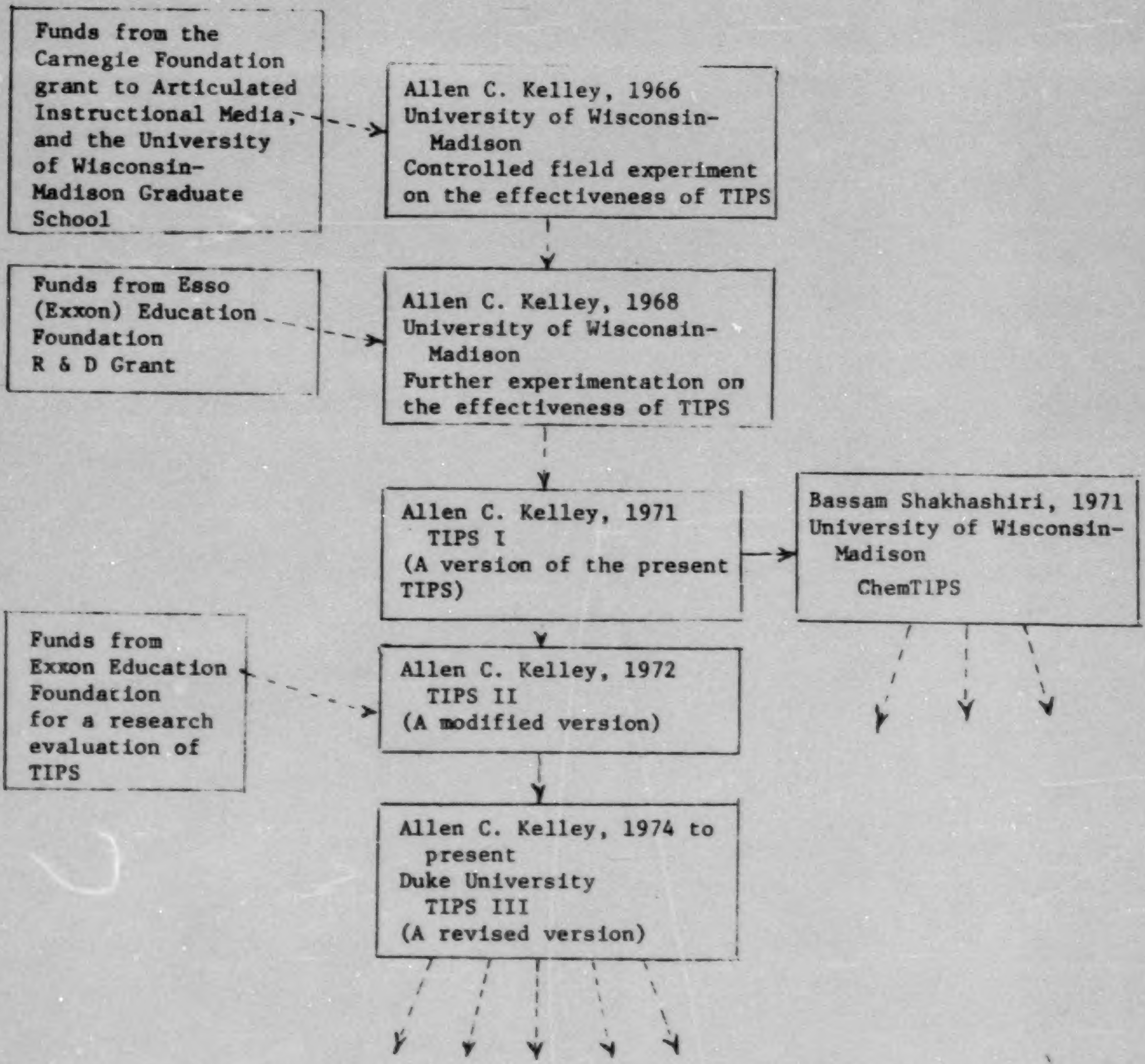
Funds from the Carnegie Foundation grant to Articulated Instructional Media, and the University of Wisconsin-Madison Graduate School
Allen C. Kelley, 1966 University of Wisconsin-Madison Controlled field experiment on the effectiveness of TIPS
Funds from Esso (Exxon) Education Foundation R & D Grant
Allen C. Kelley, 1968 University of Wisconsin-Madison Further experimentation on the effectiveness of TIPS
Allen C. Kelley, 1971 TIPS I (A version of the present TIPS)
Bassam Shakhashiri, 1971 University of Wisconsin-Madison ChemTIPS
Funds from Exxon Education Foundation for a research evaluation of TIPS
Allen C. Kelley, 1972 TIPS II (A modified version)
Allen C. Kelley, 1974 to present Duke University TIPS III (A revised version)

Figure 3-3. Evolution of TIPS.

a personalized learning system for students who want to work at their own pace, and make progress toward their objectives by a mutually-set number of tests and completed exercises. However, TIPS is different from the Keller Plan, although both consist of packaging educational techniques to suit the individual student. The difference arises from the fact that in terms of teaching approach, TIPS is more flexible. It accomodates not only the criterion-referenced, somewhat-structured planning approach of the Keller-type course, but also a more relative-referenced approach. Professor Kelley estimates that in actual implementation 80 per cent of the courses using TIPS employ an approach quite at variance with the Keller philosophy.

Dr. Elisabeth Allison at Harvard University was one of the six professors who received an Exxon grant in June, 1974 to implement TIPS. She conducted a self-paced instructional experiment including 84 students in three sections of an introductory economics course. The cross-sectional, longitudinal comparisons of the first year's experience indicate "that self-paced instruction is more effective than conventional instruction--particularly for freshmen with relatively weak educational backgrounds and students with relatively poor analytical skills" (Allison, 1974, p. 1). In an approach very similar to TIPS, students are provided with "almost unlimited, non-threatening" feedback that informs the student of his/her responsibilities. The main contribution of self-paced instruction is an emphasis on day-to-day involvement with the course that increases the amount of time and attention students invest in the course.

During the second year Dr. Allison expanded her experiment by including TIPS along with the self-paced instruction mode, and a traditional lecture-type approach. These results are not yet available.

STUDENT-TO-STUDENT COUNSELING

Student-to-Student Counseling is based on systematic training methods and materials developed to maximize the effectiveness of student counselors in counseling students about academic and personal-social matters. The student counselors are provided with about 40 hours of training sessions prior to their counseling responsibilities. Some of the important features of Student-to-Student Counseling are:

1. The use of role-playing exercises in providing the training in counseling techniques.
2. Self-criticism and self-evaluation through taped sessions in order to correct individual deficiencies as counselors.
3. Co-learning that takes place as the more experienced counselor helps train the newer counselor.
4. Use of various mass media materials and equipment as aids to the training of the student counselors.

Dr. William F. Brown is the inventor of Student-to-Student Counseling. It is an economical and effective solution to the need for more and better guidance/counseling services at the college/university level. A further advantage is the fact that the student counselors are more homophilous (that is, similar) with their counselors; hence empathy and credibility are facilitated.

Peer counseling is a mode of counseling found today in many colleges and universities. Student-to-Student Counseling is a form of peer counseling in that student counselors are used. Dr. Brown's (1972) approach deals mainly with the creation of better study skills and other techniques of college student survival; peer counseling is the means of delivering this understanding and knowledge.

Dr. Brown has been Professor of Educational Psychology and the Director of Testing and Guidance at Southwest Texas State University since 1958. The idea for Student-to-Student Counseling was conceived earlier, however, around 1951-1952. By 1955, Brown included academic ability, academic achievement, academic adjustment, and academic attitude in his model of peer counseling effectiveness developed for his doctoral thesis.

After a brief prelude in Washington, D.C., Brown came back in 1958 to Southwest Texas State University as the Director of Testing and Guidance. He felt a need for improved counseling services, and soon began to experiment with various forms of peer counseling. By 1959 his Center was deluged with students seeking counseling about academic and other matters, which he was unable to meet due to limited financial resources for the counseling program. In spite of skepticism and criticism from professional colleagues, Brown proceeded with his idea of Student-to-Student Counseling.

In the 1960's, Brown's peer counseling approach with college freshmen is estimated to have saved the state of Texas about $290,000 annually (Professor Brown estimates), through lower freshman-to-sophomore attrition rates.

In addition to test interpretation and study skills counseling, career guidance and reading improvement were included in the mid-1960's so as to broaden the original foci of the Student-to-Student Counseling program.

In 1965, Brown received a grant from the Exxon (then known as Esso) Education Foundation. His evaluation study, from 1965 to 1967, indicated very specific and positive results for Student-to-Student Counseling, and the Exxon Education Foundation made a supplementary grant to Brown to replicate his study at Laredo Junior College in Texas. By 1969-1970, wider proliferation had taken place, and Student-to-Student Counseling was in use at several universities, especially in the Texas area. Brown's testing and counseling materials have also been translated into Spanish and his student-counseling-student approach has been adapted for use at the Universidad Nacional Autonoma de Mexico.

In 1970, Brown was awarded the Nancy C. Wimmer Award by the American Personnel and Guidance Association for making the most outstanding contribution to the improvement of counseling and guidance.

In 1970, Brown took a year's sabbatical leave to write his book, Student-to-Student Counseling: An Approach to Motivating Academic Achievement (Brown, 1972). Seminars, papers presented at professional meetings, and other diffusion activities brought the innovation into a wider limelight. A growing number of former students are now in position to use and further proselytize Dr. Brown's innovation.

The inclusion of Student-to-Student Counseling as one of the four IMPACT programs was somewhat unique in that it was relatively older than the other three innovations, and many adopters/requestors thus knew of its existence prior to the launching of the IMPACT campaign.

Brown has received about $350,000 in funding over the past 25 years for the development, implementation, diffusion, and modification of Student-to-Student Counseling. In addition Brown has established a private company called Effective Study Materials, for the purpose of wider dissemination of materials about Student-to-Student Counseling to adopters and other interested persons.

Dr. Brown's Student-to-Student Counseling approach was specifically designed to increase the probability of scholastic success during the first semester of a student's freshman year. Primary focus is on the student academic counselors, since their efforts provide the unique element in a freshman counseling program (Upcraft, 1971).

"Three types of criteria--test scores, course grades, and questionnaire responses--have been employed to assess freshman reaction to peer counselors' counseling. Pre-counseling and post-counseling scores on three standardized tests--the Survey of Study Habits and Attitudes, the Effective Study Test, and the Study Skills Surveys--were utilized to evaluate the student counselors' effectiveness in teaching study skills and in communicating positive academic attitudes" (Brown, 1972, p. 100).

Dr. Brown, along with his associates, has conducted 30 major investigations, involving approximately 42,500 students enrolled at 60 high schools and colleges located in 15 different states. These evaluation studies show that the students counseled by other students receive higher academic grades, while students not counseled by other students generally remain unchanged in study habits and attitudes. The undergraduate student counselors, when compared with professional counselors, were not significantly different in counseling effectiveness, as measured in terms of student counselees' study habits and attitudes. Students counseled by peers earned higher grades (Brown, 1972).

The innovation is somewhat difficult to pinpoint in its actual use. Almost everyone who uses students as counselors for students are "sub-inventors", as each use might be considered a particular case of re-invention. Not all "adopters" exactly follow Brown's approach to suit their local conditions. Compared to the other three IMPACT innovations in the present study, we encountered somewhat greater difficulties in determining exactly who among our respondents had adopted Dr. Brown's Student-to-Student Counseling, and who had implemented a modified version of it, because it is more general in nature than the other three innovations.

THE IMPACT PROGRAM

Prior to the announcement of the IMPACT ("Implementation of Materials and Procedures Affecting College Teaching") program in November, 1973, the Exxon Education Foundation had made about 200 research and development grants to university faculty members to develop promising educational innovations. By mid-1973, it was decided that four of these innovations had reached the point where they were ready for diffusion to university professors; EXPER SIM, Guided Design, TIPS, and Student-to-Student Counseling were selected for initial inclusion in the IMPACT program.

The IMPACT program was created in order to diffuse a projected ten innovations to university faculty members in the U.S. In 1973 four innovations were selected for inclusion in the first year or so of the IMPACT program. In addition to improving the quality of teaching and learning in universities through innovation, it was hoped that the IMPACT program might also provide insight into the general process of educational change at the university level. In order to facilitate this objective, a grant was made to the Department of Journalism and the Program in Mass Communication Research at the University of Michigan to investigate the diffusion of the four IMPACT innovations. The director of this project is Dr. Everett M. Rogers. So the IMPACT program was considered an exploratory and experimental approach to diffusing educational innovations in higher education.

Actually, the diffusion of the four innovations had begun prior to the launching of the IMPACT program. Figures 3-4, 3-5, 3-6 and 3-7 show that the following number and percentages of individuals who knew about the four innovations by December, 1974 (when our present data were gathered), had such awareness-knowledge prior to the initial announcement of the IMPACT program in November, 1973:

		Number with Awareness-Knowledge	Percentage with Awareness-Knowledge
1.	EXPER SIM	196	28.9%
2.	Guided Design	247	24.6%
3.	TIPS	158	22.2%
4.	Student-to-Student Counseling	218	23.5%
	All four innovations combined	819	24.6%

These 819 knowers mainly resulted from requests to the four inventors which in turn were caused by their journal articles, papers at professional conferences, books like Brown's (1972), and other diffusion activities conducted by the four inventors, and by the sub-inventors (like Art Cromer at the University of Louisville for EXPER SIM).

However, the launching of the IMPACT program in November, 1973 rather

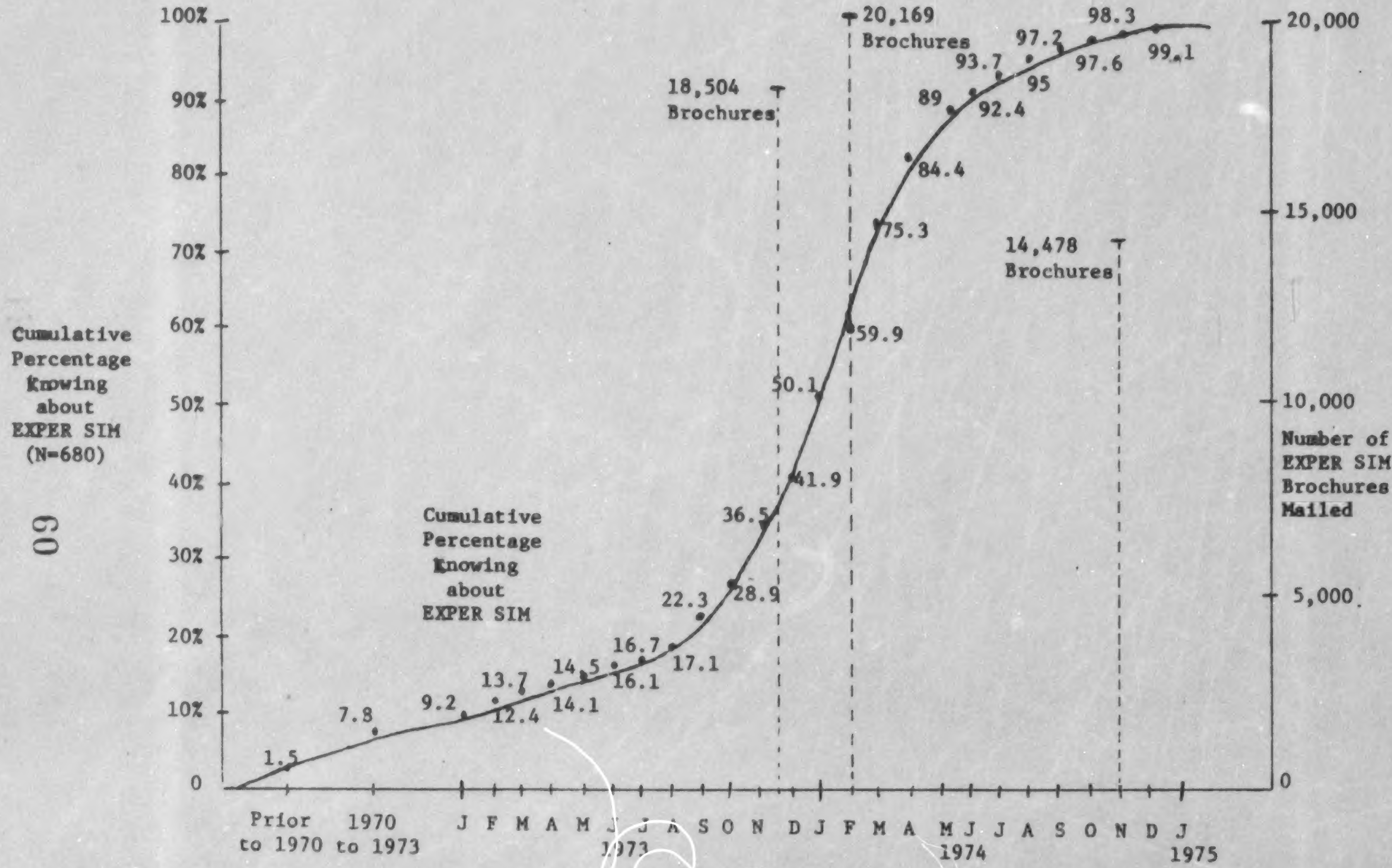

Figure 3-4. Knowing about EXPER SIM, and the Number of IMPACT Brochures about EXPER SIM that Were Mailed.

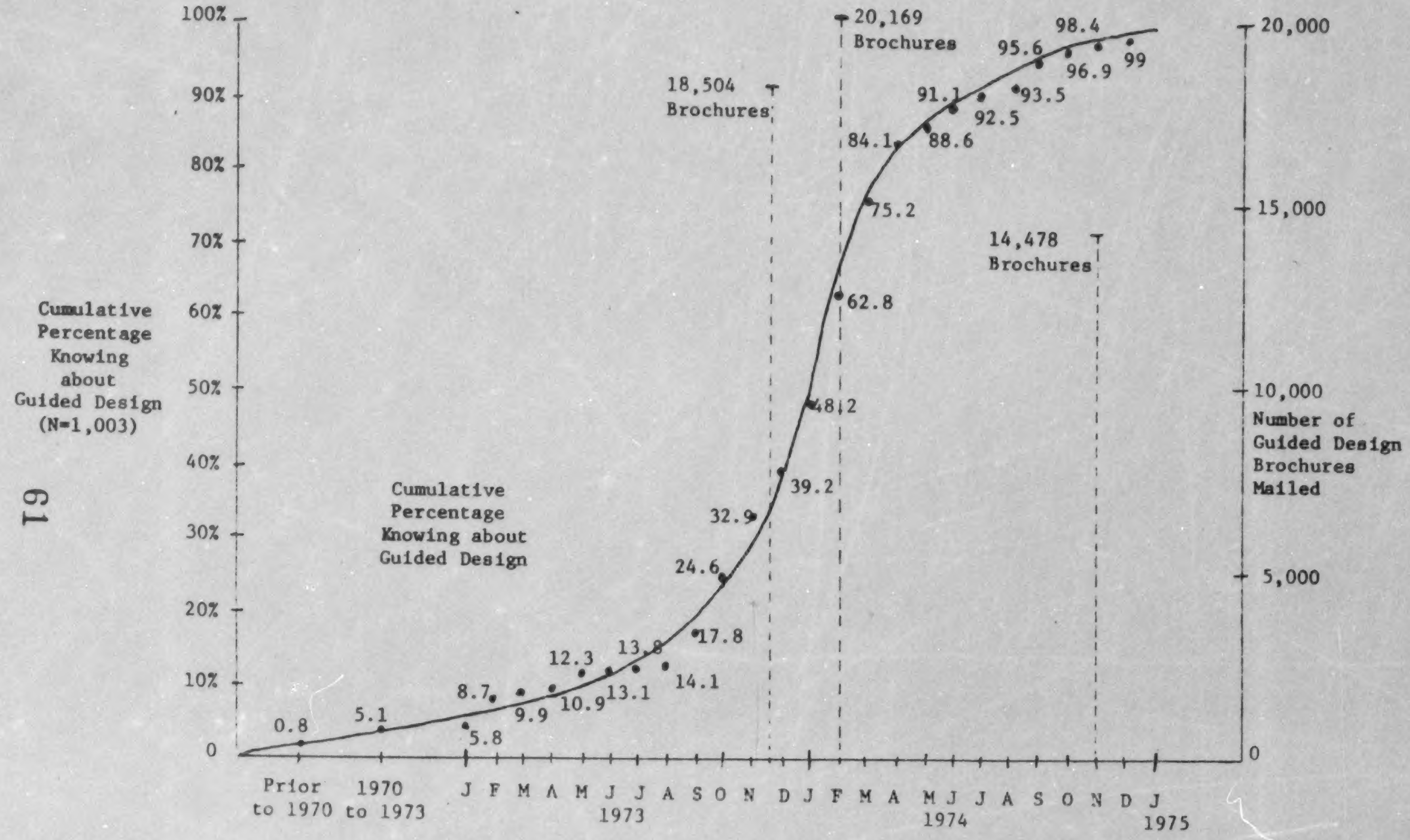

Figure 3-5. Knowing about Guided Design, and the Number of IMPACT Brochures about Guided Design that Were Mailed.

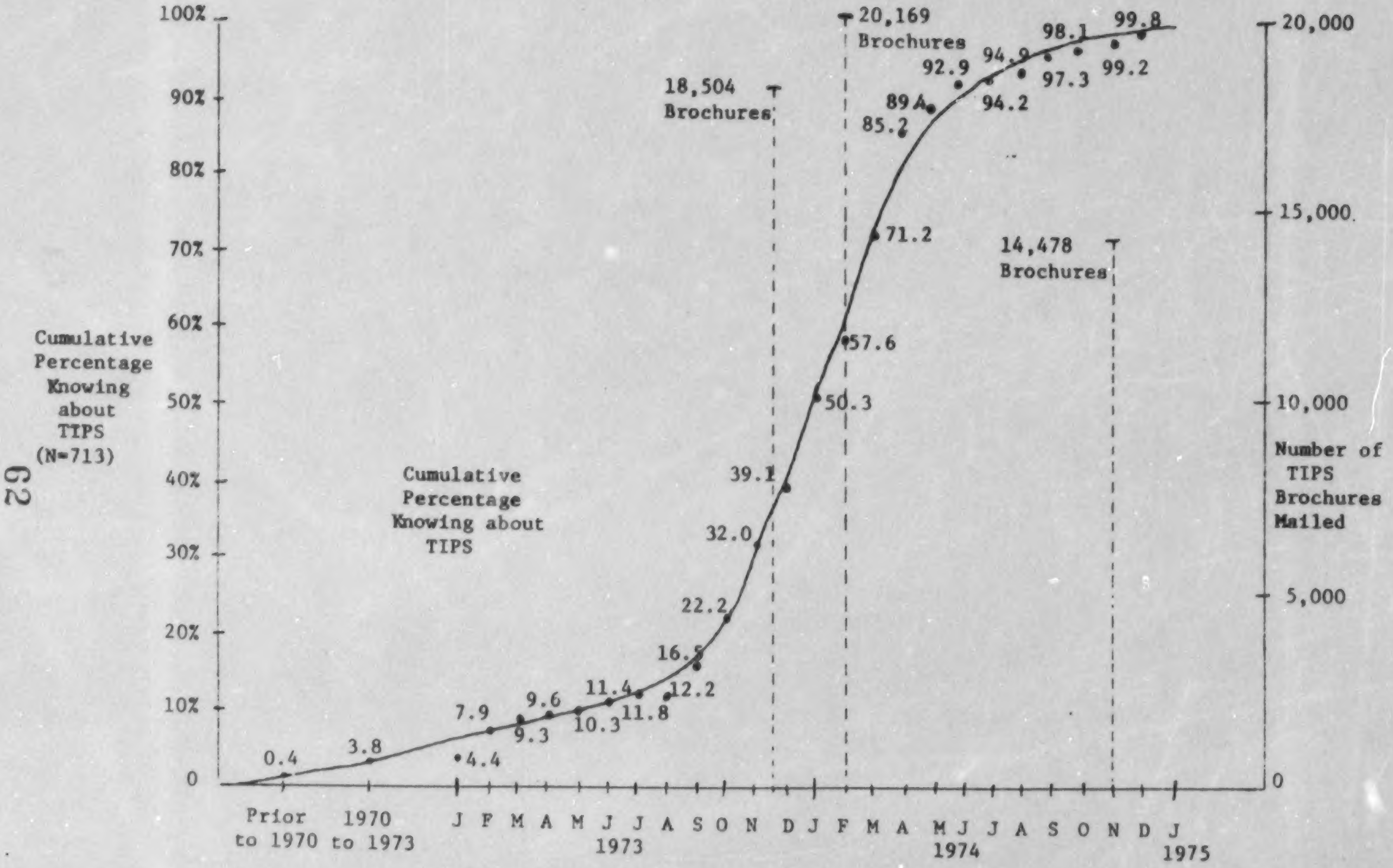

Figure 3-6. Knowing about TIPS, and the Number of IMPACT Brochures about TIPS that Were Mailed.

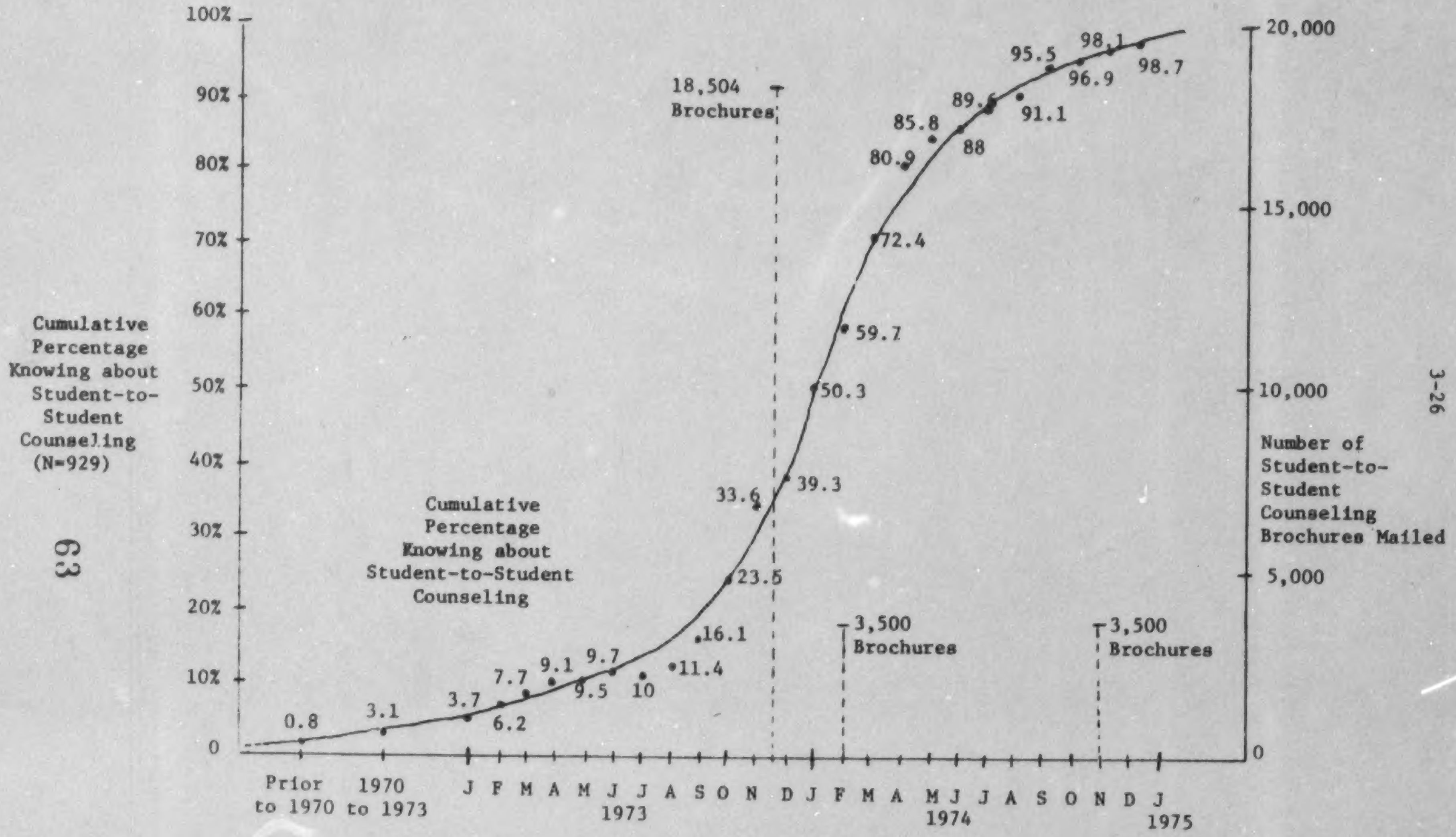

Figure 3-7. Knowing about Student-to-Student Counseling, and the Number of IMPACT Brochures about Student-to-Student Counseling that Were Mailed.

immediately began to speed up the rate of awareness-knowledge of the innovations (and the monthly number of requests), mainly as the result of a mass mailing of 18,504 brochure-packets* (to 6,168 individuals who each received three sets of packets) about the four innovations in which individuals were encouraged (1) to request a packet of descriptive materials about each innovation from the appropriate inventor, and (2) to apply for an IMPACT grant to facilitate adoption of the innovations. However, Figures 3-4, 3-5, 3-6, and 3-7 show that the rate of awareness-knowledge was already increasing rapidly in the few months just prior to the first mass mailing in November, 1973 (in fact, almost half of the 819 with awareness-knowledge occurred in September and October of 1973). During the first year of the IMPACT program, the cumulative number of awareness-knowers per month makes an S-shaped curve for each of the four innovations.

A sizeable number of responding requests were informed about the four IMPACT innovations by November-December, 1974 (when most of our data on this issue were gathered), as shown in Figures 3-4, 3-5, 3-6, and 3-7.

		Total Number of Responding Requests
1.	EXPER SIM	680
2.	Guided Design	1,003
3.	TIPS	713
4.	Student-to-Student Counseling	929
	All four innovations combined	3,325

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*Copies of the brochure describing the IMPACT program, and each of the four IMPACT innovations, may be found in Appendix A.

However, it must be kept in mind (as we showed previously) that about one-fourth of these 3,325 responding requests were aware of the innovation prior to the launching of the IMPACT program in November, 1973.

We checked these data on awareness-knowledge against lists of the requestors obtained from each of the four inventors, and the sub-inventors. We think these lists are fairly accurate, although the number of requests prior to the launching of the IMPACT program may be somewhat incomplete. Generally, the number of requests (Table 3-1) and the data on awareness-knowledge (obtained from our Phase I respondents) agrees rather well. The main discrepancy is due to the fact that not all (actually only about 90 per cent) of the requests listed by the inventors/sub-inventors (Table 3-1) responded to our Phase I mailed questionnaire, and thus could be reported as knowers about the four IMPACT innovations in Figures 3-4, 3-5, 3-6, and 3-7.

In any event, these data on the number of requests shows that the IMPACT program reached a fairly large number of university professors, and motivated them to request further information about the innovations.

Table 3-1 shows that 2,520 individual requestors (82 per cent) of the 3,058 requestors made single requests, just asking for information about one of the IMPACT innovations. The remaining 538 requestors (18 per cent of the total) made 1,577 requests (38 per cent) of the total of 4,097 requests (Table 3-1). Many of these 538 multiple requestors, 178 in number (33 per cent), asked for information about all four innovations, thus making a total of 712 requests (about 17 per cent of all requests). In Chapter 5, we find that these 538 multiple requestors have characteristics and motivations that differ from the rest of our Phase I respondents, who are single requestors.

Table 3-1. Single and Multiple Requestors of the Four IMPACT Innovations by Their Number of Requests, by Innovation, as of October, 1974.

Types of Requests	Number of Individual Requestors	Number of Requests				
		EXPER SIM (E S)	Guided Design (GD)	TIPS (TIPS)	Student-to Student Counseling (SSC)	Total Number of Requests for the Four Innovations
I. Single Requests	2,520	494	712	439	875	2,520
1. ES only	(494)	(494)	--	--	--	(494)
2. GD only	(712)	--	(712)	--	--	(712)
3. TIPS only	(439)	--	--	(439)	--	(439)
4. SSC only	(875)	--	--	--	(875)	(875)
II. Multiple Requests	538	398	462	440	277	1,577
1. ES-GD	(51)	(51)	(51)	--	--	(102)
2. ES-TIPS	(43)	(43)	--	(43)	--	(86)
3. ES-SSC	(9)	(9)	--	--	(9)	(18)
4. GD-TIPS	(75)	--	(75)	(75)	--	(150)
5. GD-SSC	(22)	--	(22)	--	(22)	(44)
6. TIPS-SSC	(15)	--	--	(15)	(15)	(30)
7. ES-GD-TIPS	(92)	(92)	(92)	(92)	--	(276)
8. ES-GD-SSC	(16)	(16)	(16)	--	(16)	(48)
9. ES-TIPS-SSC	(9)	(9)	--	(9)	(9)	(27)
10. GD-TIPS-SSC	(28)	--	(28)	(28)	(28)	(84)
11. ES-GD-TIPS-SSC	(178)	(178)	(178)	(178)	(178)	(712)
Totals	3,058	892	1,174	879	1,152	4,097

Table 3-2 shows the number of IMPACT brochures that were mailed by the Exxon Education Foundation to various categories of recipients by month during 1974. A total of 38,163 individual recipients were mailed 60,151 sets of the brochure/packets* about the IMPACT program, and one or more of the four innovations. Many of these brochures were passed along to others, and often the original brochure was copied by the original recipient for wider distribution. We cannot assess accurately how widely each mailed brochure was further copied or passed along, but we have reason to think this multiplication was often considerable. For instance, we learned of one brochure that passed through four different hands at one university. In Chapter 4, we show that the IMPACT brochures were by far the most frequently-cited source/channel of communication about the IMPACT program, and about each of the four innovations.

In addition to the brochures, other promotional activities in the IMPACT program were:

1. An advertisement placed in Change magazine, which led to 149 requests for further information about the four innovations. The ad is reproduced in Figure 3-8.

2. Talks at seminars and conferences, papers presented at professional meetings, and publications by the four inventors, which were encouraged by the IMPACT program.

3. Receipt of a total of 227 proposals for IMPACT grants in March, 1974 (the deadline for the first competition); 182 proposals in July, 1974; and

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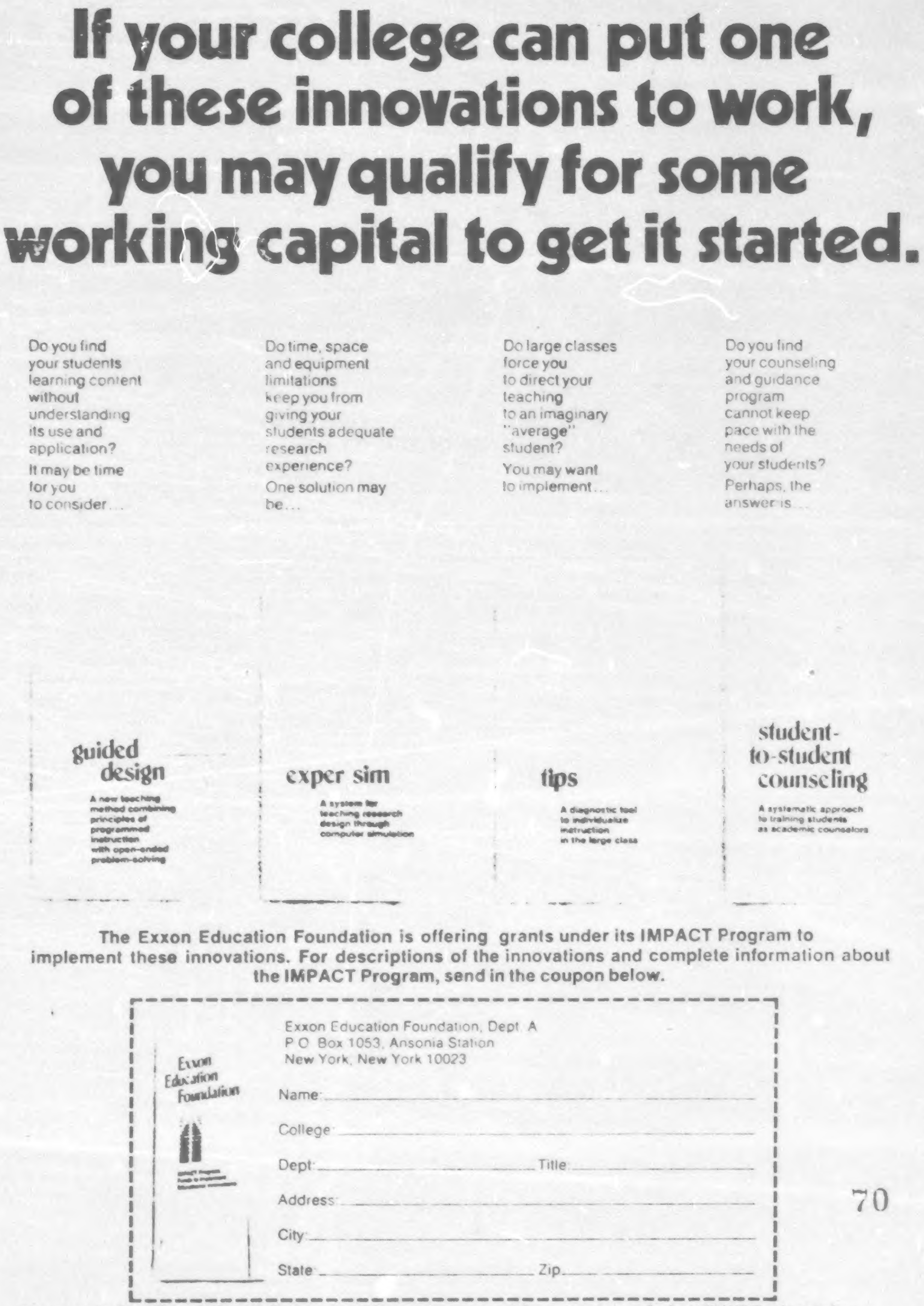
*Many of these mailings, as indicated in Table 3-2, consisted of three sets of brochures to each individual, in order to encourage passing them along to other individuals.

Table 3-2. Mass Mailing of IMPACT Brochure/Packets, by Categories of Recipients.

Mailing Number	Time of Mailing	Types of Recipients	Number of Recipients	Materials Mailed
#1	November, 1973	Engineering College Deans	201	Three sets were mailed to each individual, each consisting of the IMPACT brochure and the four innovation brochures
		Liberal Arts College Deans	1,237	
		College and University Presidents	2,485	
		Junior College Deans	2,245	
		Sub-total	6,168	(18,504 sets of brochure/ packets)
#2	February, 1974	1. Chairmen of the following departments at institutions with enrollments over 1,000: Biology Chemistry Economics Education English Geography History Mathematics Philosophy Psychology Physics Political Science Sociology	19,240	IMPACT brochure and innovation brochures about EXPER SIM, Guided Design, and TIPS
		2a. Engineering Department Chairmen	138	Same as above
		2b. List provided by Charles Wales of individuals interested in Guided Design	91	Same as above
		3. Deans of Students at colleges and universities	3,500 (approx.)	IMPACT brochure and the brochure on Student-to-Student Counseling
		4. Deans of college and university-affiliated Schools of Business or Chairmen of Business Departments	700 (approx.)	IMPACT brochure and brochures on EXPER SIM, Guided Design, and TIPS
		Sub-total	23,669	

Mailing Number	Time of Mailing	Types of Recipients	Number of Recipients	Materials Mailed
#3	October, 1974	1. Deans of Liberal Arts Colleges at four-year institutions with an enrollment over 2,000	750 (approx.)	Three sets were mailed to each individual, each consisting of the IMPACT brochure and the brochures on EXPER SIM, Guided Design, and TIPS
		2. Academic Vice-Presidents at four-year institutions with over 2,000 enrollment	750 (approx.)	Same as above
		3. Academic Deans of four-year colleges with enrollments of less than 2,000	1,000	Same as above
		4. Deans of Junior Colleges	2,326	Same as above
				(Sub-Sub-Total 14,478 sets of brochure/packets)
		5. Directors of Freshman Counseling in two and four-year public and private colleges and universities	3,500 (approx.)	IMPACT brochure and the brochure on Student-to-Student Counseling
		Sub-Total	8,326	(17,978 sets of brochure/packets)
		Total Number of Individual Recipients	38,163	(60,151 sets of brochure/packets)
		Total Number of EXPER SIM, Guided Design, and TIPS Brochure/Packets Mailed	53,151	
		Total Number of Student-to-Student Counseling Brochure/Packets Mailed	25,504	



If your college can put one of these innovations to work, you may qualify for some working capital to get it started.

Do you find your students learning content without understanding its use and application?

It may be time for you to consider…

Do time, space and equipment limitations keep you from giving your students adequate research experience?

One solution may be…

Do large classes force you to direct your teaching to an imaginary "average" student?

You may want to implement…

Do you find your counseling and guidance program cannot keep pace with the needs of your students?

Perhaps, the answer is…

guided design

A new teaching method combining principles of programmed instruction with open-ended problem-solving

exper sim

A system for teaching research design through computer simulation

tips

A diagnostic tool to individualize instruction in the large class

student-to-student counseling

A systematic approach to training students as academic counselors

The Exxon Education Foundation is offering grants under its IMPACT Program to implement these innovations. For descriptions of the innovations and complete information about the IMPACT Program, send in the coupon below.

Exxon Education Foundation

Exxon Education Foundation, Dept. A
P.O. Box 1053, Ansonia Station
New York, New York 10023

Name: ____________________

College: ____________________

Dept: __________ Title: __________

Address: ____________________

City: ____________________

State: __________ Zip: __________

Figure 3-8. The IMPACT Program Advertisement that Appeared in CHANGE Magazine.

115 proposals in February, 1975 (Table 3-3). We note that the number of grant proposals decreased in each succeeding competition (Figure 3-9), as did the number of new knowers about the innovations, and the number of requests to the four inventors in the succeeding months after the first mass mailing (the peak in the number of monthly requests was reached in February-March-April, 1974, for the four innovations).

4. Out of the 227 grant proposal applicants in March, 1974, 44 individuals were selected to attend the four May, 1974 training workshops conducted by the inventors, and 40 additional individuals attended the October, 1974 workshops (out of the 182 proposal applicants), as shown in Table 3-3. In addition, Dr. Main held an EXPER SIM workshop for 18 individuals who were not necessarily grant applicants to the IMPACT program in August, 1974.

5. From these 84 (21 per cent) individuals (who were chosen from the 409 proposal applicants) attending the workshops, 55 (13 per cent of the applicants) were awarded IMPACT grants to facilitate their adoption of the four innovations (Table 3-3).

The drop-off in the rate of grant proposals may have occurred because the "pool" of potential applicants, once informed about the IMPACT program by the brochure mailings beginning in November, 1973, was exhausted in the three successive proposal competitions, and was not replenished by additional individuals coming into the "pool" because:

1. The manner in which the grant applications were rejected in the past may have discouraged some individuals from applying for a grant proposal, or from re-applying after rejection of a previous proposal.

Table 3-3. Number of IMPACT Grant Proposals, Workshop Attendees, and Grantees for the Four Innovations.

The Four IMPACT Innovations	Number of Grant Proposals Made to the Exxon Education Foundation				Number of Participants at Training Workshops			Number of IMPACT Grantees		
	March, 1974	July, 1974	Feb., 1975	Total	May, 1974	Oct., 1974	Total	June, 1974	Dec., 1974	Total
1. EXPER SIM	58	40	8	106	10	8	18	6	7	13
2. Guided Design	48	39	31	118	10	10	20	6	8	14
3. TIPS	39	34	18	91	12	9	21	6	5	11
4. Student-to-Student Counseling	82	69	58	209	12	13	25	9	8	17
Totals	227	182	115	524	44	40	84	27	28	55

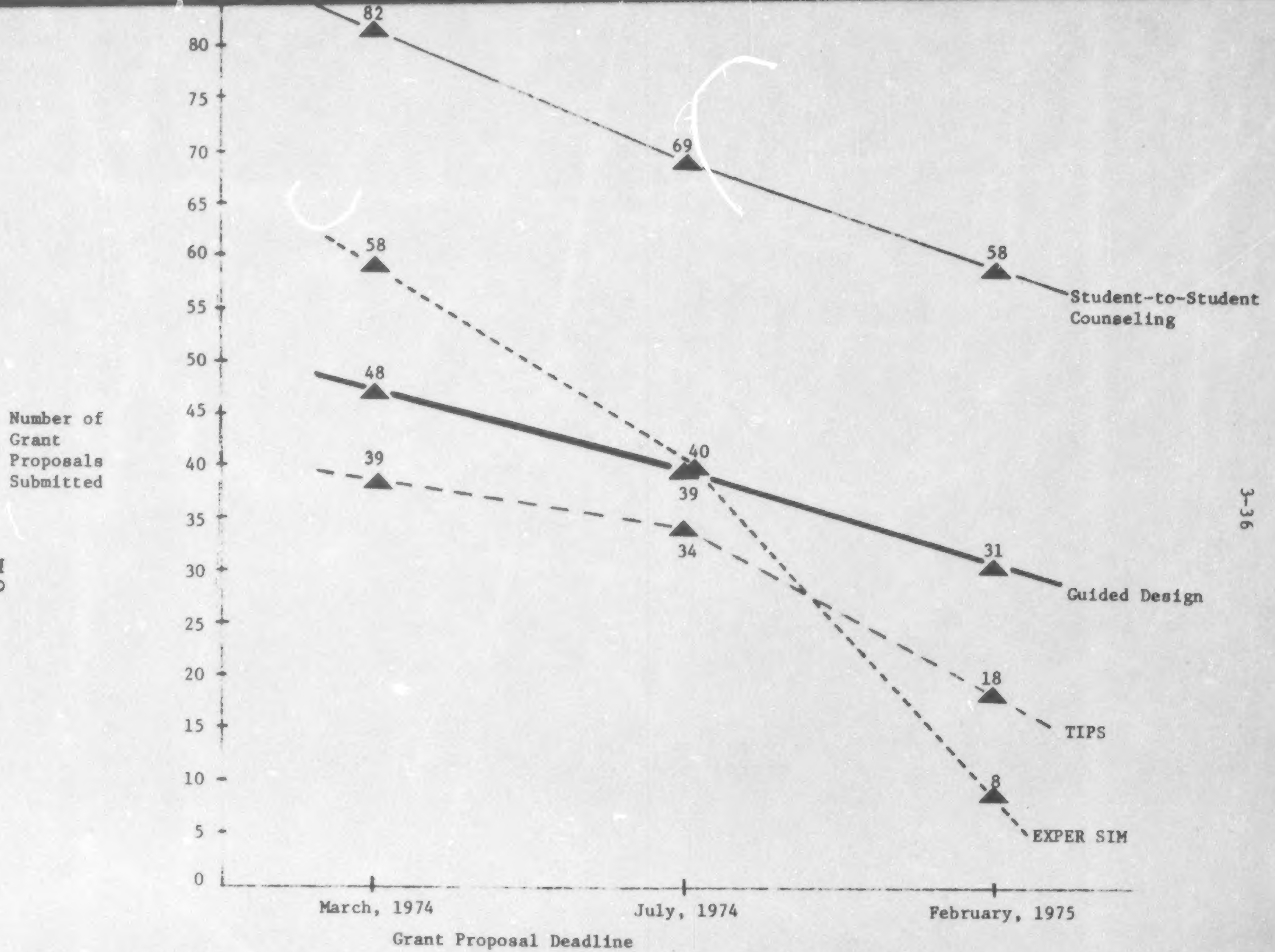


Figure 3-9. Decrease in the Rate of Grant Proposals for the Four IMPACT Innovations Submitted to the Exxon Education Foundation.

2. It may have been relatively too early for the grantees and spontaneous adopters to interpersonally diffuse their successful experience with the IMPACT innovations to very many secondary receivers, as many of the adopters only began using their innovation in late 1974. Nevertheless, we show in Chapter 5 that the grantees and spontaneous adopters (and requestors) each reported talking to an average of several colleagues about the four innovations, even though these conversations seldom consisted of a strong encouragement to adopt the innovation; mostly the discussions conveyed information about the innovation, but little positive influence to adopt. So perhaps the secondary receiver thus contacted was seldom motivated to make a grant proposal application. This explanation of the drop-off in application rates essentially argues that once the original "pool" was exhausted, it was not replenished in late 1974 and early 1975 by the secondary diffusion of knowledge about the IMPACT program and the four IMPACT innovations emanating from early grantees, spontaneous adopters, and requestors. But such secondary (and tertiary) diffusion may occur at a later period after grantees and adopters have gained further personal experience with the innovations.

Some possible evidence for this "exhausted-and-not-yet-replenished pool" hypothesis is suggested by Figures 3-4, 3-5, 3-6, and 3-7, which all show a leveling-off in the number of individuals who have a detailed awareness of the four innovations (and who requested information about them from the inventors). If the number of proposals per time period is a constant proportion of requests, one would expect approximately the same degree of fall-off in proposals that occurred in the three succeeding grant competitions.*

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*However, this argument does not explain the differential fall-off for EXPER SIM as compared with the other three innovations.

Unfortunately our data do not provide a definitive explanation of why the fall-off in applications occurred in 1975.

Nevertheless, the 524 grant proposals made in the first three competitions (Table 3-3) is one evidence of the effect of the IMPACT program.

Table 3-4 shows there are many more pre-IMPACT adopters of Guided Design than of the other three innovations. There are many more post-IMPACT spontaneous adopters than pre-IMPACT spontaneous adopters for each of the four innovations (Table 3-3).* This is one evidence of the effectiveness of the IMPACT program.

A rather impressive number of requestors (219) say they intend to adopt one of the IMPACT innovations during the 1974-75 school year (Table 3-4).

Here are the number of individuals reached by the IMPACT program at each stage in the innovation-decision process:

#1. Requests for information about one of the four IMPACT innovations from the four inventors, and the sub-inventors--------------------------------4,097

#2. Proposal applicants for an IMPACT grant in the March, 1974; July, 1974; and February, 1975 competitions---------------------------------------524

#3. Attended one of the four inventors' training workshops in May, 1974 or October, 1974--------------84

#4. Awarded an IMPACT grant for adoption of one of the four innovations in June, 1974 or December, 1974---55

#5. Spontaneous adopters of one of the four IMPACT innovations:
(1) Prior to the IMPACT program----------------------------30
(2) During the IMPACT program-------------------------------------178

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*Spontaneous adopters are individuals who have decided to adopt an innovation (1) prior to the IMPACT program, or (2) since the IMPACT program, but without a grant from the Exxon Education Foundation.

Table 3-4. Number of Adopters of the Four IMPACT Innovations as of June, 1975, by Innovation.

Type of Adopter	Number of Adopters				
	EXPER SIM	Guided Design	TIPS	Student-to Student Counseling	Total
1. Pre-IMPACT Spontaneous Adopters (adopting prior to the launching of the IMPACT program in November, 1973)	3	19	1	7	30
2. Grantee-Adopters (June, 1974 and December, 1974)	13	14	11	17	55
3. Post-IMPACT Spontaneous Adopters (adopting after the launching of the IMPACT program in November, 1973)	33	38	9	98	178
4. Intended to Adopt during the 1974-1975 Academic Year	(42)	(52)	(19)	(106)	(219)
Total adopters as of June, 1975	49	71	21	122	263
Total likely number of adopters at the end of the 1974-1975 academic year	(91)	(123)	(40)	(228)	(482)

The IMPACT program seems to have reached a fairly large number of university professors, and to have motivated a fair number of them to some action, such as requesting further information from one of the inventors, making a grant proposal, attending a training workshop, and/or adopting one of the four innovations. In later chapters, we also show that many of the individuals reached directly by the IMPACT program were motivated to informally discuss the IMPACT program and/or one or more of the IMPACT innovations with one or more of their colleagues.

Chapter 4

CONDUCT OF THE RESEARCH PROJECT

The purpose of this chapter is to describe the procedures by which the research project was conducted. We organize this material in terms of the three main data-gathering phases of the project:

I - Requestors' mailed questionnaire

II - Personal and telephone interviews with grantees, adopters, and others

III - Telephone interviews with secondary receivers

Our sections in this chapter generally follow a chronological time-order of presentation. Before beginning our Phase I study of requestors, we spent about four months in preliminary project activities: Hiring and training the research staff, reviewing relevant literature, and conducting exploratory personal interviews and discussions with the four inventors, sub-inventors, and with a small number of requestors, grantees, workshop attendees, and others.

PHASE I - MAILED QUESTIONNAIRE TO REQUESTORS

Requestors are individuals who contacted the four inventors and/or sub-inventors to ask for detailed information about one of the four IMPACT innovations. Most of the names of requestors were obtained from lists maintained by each of the inventors/sub-inventors. The Exxon Education Foundation also provided us with a list of 843 individuals (1) who had asked for information about the IMPACT innovations from the Exxon Education Foundation, or (2) who had mailed a coupon in response to the advertisement about the IMPACT program in Change magazine (N=149) that we showed in Figure 3-8.

The 843 individuals who had directly contacted the Exxon Education Foundation were sent a mailed questionnaire in September, 1974, to determine whether any of these individuals had then requested information about one or more of the innovations from an inventor/sub-inventor. The response rate to the mailed questionnaire was 40 per cent (339 individuals). Respondents who said they had requested information about one or more of the four innovations were added to our sampling frame.

We sent all of the individuals who had requested information about the IMPACT innovations our mailed questionnaire in Phase I. We used the cut-off date of October, 1974 for these requestors (as our Phase I questionnaire was mailed out in November, 1974, although further requests were still coming to the inventors/sub-inventors (Figures 3-4, 3-5, 3-6, and 3-7).

We developed through pretesting about four different versions of the mailed questionnaire, before it was finalized (Appendix C). In early October, 1974, we conducted a pilot study with a sample of 100 requestors.

Prior to the mailing of the first wave Phase I questionnaire, we had conducted 137 interviews, some personally and some by telephone with Phase II grantees, adopters, and others. These 137 interviewees had been administered the Phase I questionnaire, and so they were excluded in the first wave mailing in November, 1974. These 137 respondents* represent 4 per cent of the sample population of 3,058 requestors and 3 per cent of the 4,097 total requests made by them.

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*Respondents are individual requestors who responded to our mailed questionnaire in November, 1974 or January, 1975, or to our telephone interview follow-up with those who had not responded to the mailed questionnaire.

First Wave of Mailed Questionnaires to Requestors

The first wave of the Phase I data-gathering from requestors began in November, 1974 (Table 4-1). The questionnaires were mailed to 2,921* requestors who made 3,960 requests for information about the four IMPACT innovations. These figures do not include the 137 already-interviewed requestors on whom questionnaire data had been collected in their personal or telephone interviews.

We achieved the relatively high response rate of 65 per cent to the first wave mailing because: (1) our questionnaire was short, as the result of thorough pretesting, (2) our respondents had previously expressed their interest in one or more of the innovations, and we appealed to this interest, (3) college professors at universities may accord relative importance to receiving a questionnaire from a university source, (4) we used attention-getting devices like colorful commemorative stamps on our envelopes, and (5) after successful pre-testing, we decided to place two dimes on the top of the cover letter, indicating that an estimated 12 minutes' time was required to fill out the questionnaire, and suggesting to the respondents that they drink a cup of coffee at our expense while they filled out the questionnaire (Appendix C).**

Second Wave of Mailed Questionnaires to Requestors

In January, 1975, we knew that about 35 per cent (N=1,026) of our requestors were non-respondents to the first wave questionnaire. We sent them

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*Also included are the 100 individuals from the pilot survey in October, 1974.

**The idea of attaching a small coin to a questionnaire was suggested to us by Professor William Brown, the inventor of Student-to-Student Counseling.

Table 4-1. Rate of Response to Phase I Mailed Questionnaire and Personal/Telephone Interviews, by Requestors and by Requests.

Data-gathering Step	Individual Requestors: Percent of Response	Individual Requestors: Responded	Individual Requestors: Did not Respond	Individual Requestors: Total	Requests: Percent of Response	Requests: Responded	Requests: Did not Respond	Requests: Total
#1. Personal and telephone interviews with adopters, who were administered the questionnaire prior to the first wave mailing		137	(2,921) (Not interviewed)	3,058		137	(3,960) (Not interviewed)	4,097
#2. First wave mailed questionnaire in November, 1974	65%	1,895	1,026	2,921	62%	2,448	1,512	3,960
#3. Second-wave mailed questionnaire in January, 1975, to non-respondents to the first wave	31%	320	706	1,026	29%	436	1,076	1,512
Cumulative total response	77%	2,352		3,058	74%	3,021		4,097
#4. Unusable questionnaires due to duplications and/or inadequate data	15%	106	(600) (Non-Respondents)	706	27%	290	786 (Non-Responding Requests)	1,076
#5. Telephone interviews with a 10 percent random sample of non-respondents to the second wave questionnaire in February, 1975.								
a. For the 10 percent sample	86%	52	8	60	80%	76	8	84
b. For the 100 percent population		(520)	(80)	(600)		(677)	(109)	(786)
Estimated cumulative total response (including weighted population)	94%	2,872		3,058	90%	3,698		4,097

a follow-up letter and a second copy of the questionnaire in January, 1975 (Appendix D), to which we received a 31 per cent response of requestors (and 29 per cent of requests) by late February, 1975. The second wave cover letter appealed to the requestors' feeling of professional responsibility to cooperate in the study. By our cut-off date on the second wave mailing, we had achieved a total response of 2,352 requestors or 77 per cent (Table 4-1).

During February, 1974, we telephone-interviewed a 10 per cent sample of the 600 non-respondents to our second-wave questionnaire.* We tried three telephone call-backs and if the requestor was still unavailable, they were considered as "non-respondents". A total of eight such cases were encountered out of the 60 individuals called, representing 80 non-respondents (as the sample of eight was a random 10 per cent selection), and 84 requests (Table 4-1). So we achieved a total rate of response of 86 per cent (including the 495 "replicated respondents" that are represented by the 55 telephone interview respondents obtained in February, 1975). As the 52 telephone respondents are a random 10 per cent sample of 520 requestors, we replicated each of the 52 respondents' IBM data-cards approximately ten times, thus yielding the final total of 2,872 responding requestors, which is 94 per cent of the total of 3,058 requestors. By a stricter standard, we received unusable responses from a total of 2,404 of the 3,058 requestors, a response rate of 79 per cent.

A parallel logic can be followed for the request as the unit of analysis, rather than the requestor. A 90 per cent response rate for requests (3,698 out of the population of 4,097 requests) was achieved (Table 4-1). By the stricter standard which does not include the 601 replicated requests, we achieved 3,097 usable responses, a response rate of 76 per cent.

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*One hundred six of the 706 "non-respondents" to the second wave mailing had returned questionnaires with duplicate or inadequate data, and these were dropped from our analysis (Table 4-1).

The response data just discussed are also shown in diagramatic form in Figure 4-1.

Large-scale surveys are not always devoid of errors, despite the quality control measures taken by the research staff. These errors are of several kinds in the Phase I data-gathering. We received 106 requestor-questionnaires (3 per cent) that represented 290 requests (or 7 per cent of the total of 4,097 requests) that were unusable (Table 4-1) due to incomplete data, or irrelevant information provided by the respondents. Some of these unusable responses were caused by our errors in identifying correct innovation requests, through our mistakes in coding, mailing, and duplication. Some requestor-questionnaires were returned blank, perhaps because the addressed person had moved since our mailing list was prepared.

The non-responding requestors are individuals who did not respond to our first and second wave mailed questionnaire, nor to our telephone follow-ups. These 80 non-responding requestors made 109 requests; on a weighted basis, they comprise 6 per cent of the total 3,058 requestors and 10 per cent of the total 4,097 requests.

The total response rate excludes both unusable data due to our, and our respondents', errors and non-response (Table 4-2). One hundred and eighty-six requestors' data (6 per cent) and their 399 requests (10 per cent) could not be included in our data-analysis.

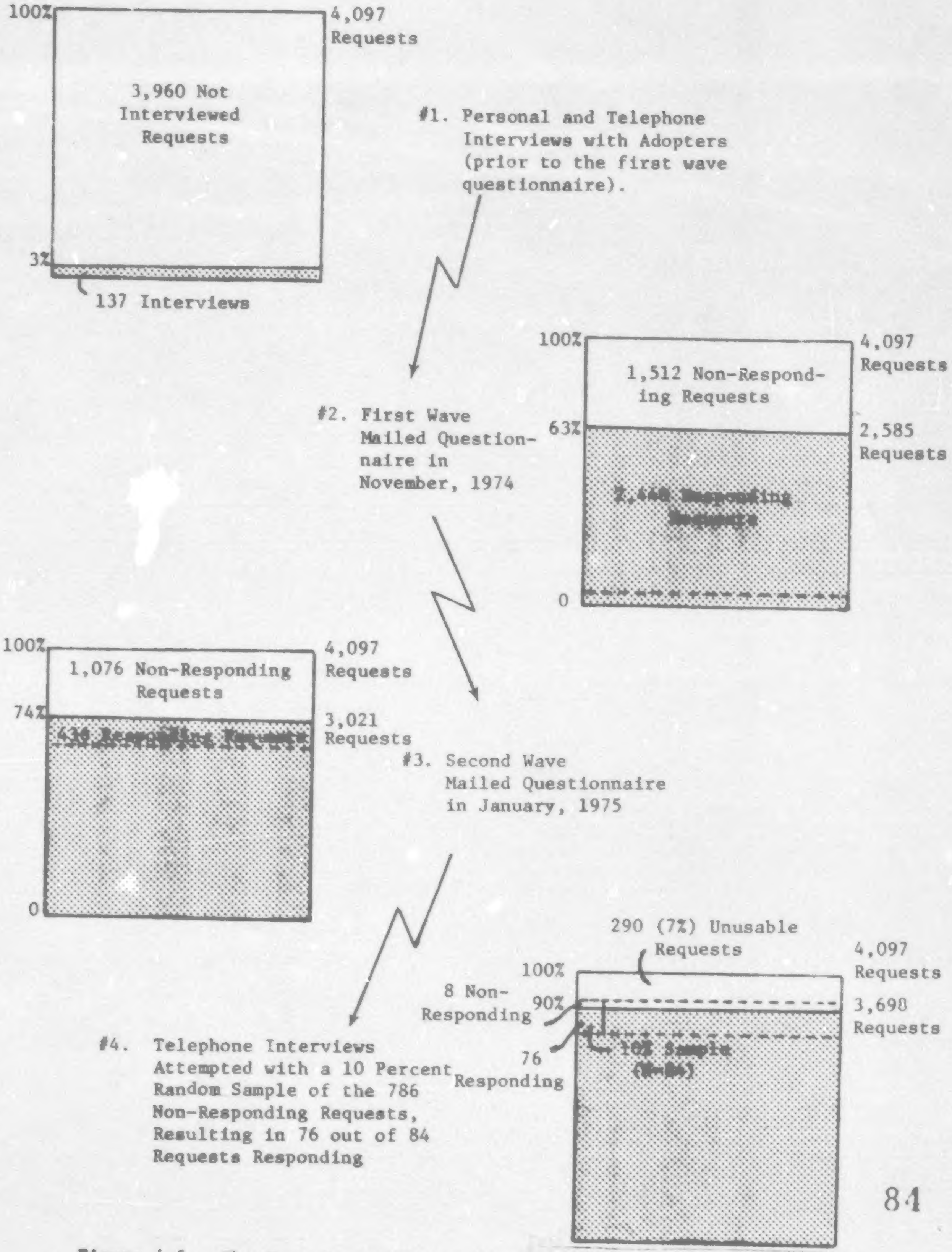
100%
4,097 Requests
3,960 Not Interviewed Requests
3%
137 Interviews
#1. Personal and Telephone Interviews with Adopters (prior to the first wave questionnaire).
100%
4,097 Requests
1,512 Non-Responding Requests
63%
2,585 Requests
2,448 Responding Requests
0
#2. First Wave Mailed Questionnaire in November, 1974
100%
4,097 Requests
1,076 Non-Responding Requests
74%
3,021 Requests
436 Responding Requests
0
#3. Second Wave Mailed Questionnaire in January, 1975
290 (7%) Unusable Requests
100%
4,097 Requests
8 Non-Responding
90%
3,698 Requests
76 Responding
10% Sample (N=84)
#4. Telephone Interviews Attempted with a 10 Percent Random Sample of the 786 Non-Responding Requests, Resulting in 76 out of 84 Requests Responding

Figure 4-1. The Four Stages of Data-Gathering Achieved a 90 Percent Response of the Requests, with Three Percent Non-Responding Requests and Seven Percent Unusable Requests.

Table 4-2. Summary of Unusable Data and Non-Response in the Phase I Data-Gathering from Requestors.

	Requestors		Requests	
Reasons	N (3,058)	Percent (100%)	N (4,097)	Percent (100%)
1. Unusable data	106	3%	290	7%
2. Non-responding				
a. For the 10 percent sample	(8)	(14%)	(8)	(10%)
b. For the weighted 100 percent population	80	3%	109	3%
Totals	186	6%	399	10%

Data-Analysis Procedures for the Request Data

Most of the request data came from the mailed questionnaire, but we also coded data as to the student enrollment at the requestor's institution, the highest degree granted, religious affiliation, etc. from the U.S. Office of Education's (1974) Educational Directory, 1973-1974. The Gourman rating for each institution was also coded onto each requestor's IBM cards. The Gourman Report was prepared by Jack Gourman (1967) of the Arizona Continuing Education Institute. The report provides an index for most colleges and universities that is claimed to indicate the general academic quality and/or prestige of the institution. Gourman computed this index on the basis of the relative success of the institution's past students when they enroll elsewhere in graduate or professional schools.

A spot-check for coding precision was made, and found to be satisfactory.

For most of our purposes in this report, the "request" is our unit of response. We distinguish the request from the requestor (the individual who makes the request), as one requestor can request information on one, two, three, or four of the IMPACT innovations.

PHASE II - PERSONAL AND TELEPHONE INTERVIEWS WITH GRANTEES, WORKSHOP PARTICIPANTS, SPONTANEOUS ADOPTERS, AND NON-ADOPTERS

Now we turn to the second phase of our research, in which we sought to supplement the highly quantitative data in Phase I from the requestors, with semi-structured interviews with adopters, grantees, and others.

Types of Individuals Interviewed Personally by Telephone, by Innovation

We interviewed a total of 245 individuals from August, 1974 to April, 1975. The interviewees represent various types of individuals at different stages in the innovation-decision process for the four IMPACT innovations. We contacted the respondents either personally or by telephone. All of the October, 1974 workshop attendees were personally interviewed during the workshops at Ann Arbor, Morgantown, Durham and San Marcos.

The other individuals interviewed were identified from four main sources:

1. The Phase I information requestor file.
2. We obtained a list of "reported" adopters of the four IMPACT innovations from the inventors/sub-inventors (in certain cases, the inventors/sub-inventors were not sure that adoption had actually occurred). We sent 92 letters to these "reported" adopters in October, 1974, to which 43 adopters replied. Of these 43, 16 were EXPER SIM adopters; 13, Guided Design; two, TIPS; and 12, Student-to-Student Counseling adopters. Eight other spontaneous adopters were identified in the workshop interviews, or through our correspondence with the inventors during Fall, 1974.
3. The Phase I returned mailed questionnaires in December, 1974 and January, 1975 were the source of names of numerous post-IMPACT spontaneous adopters and of non-adopters, from which we selected a sample that were interviewed.

We interviewed the following categories of respondents whose data constitute Phase II.

1. Grantee-adopters are individuals who wrote proposals, attended the workshops, and subsequently received an IMPACT grant to implement one of the IMPACT innovations. We interviewed 55 grantees. These grantees are only those who received grants in the first and second round of grant competition (Table 4-3). Time did not allow us to include the third round of grantees in the present study.
2. Spontaneous adopters are individuals who have decided to adopt an innovation either (1) prior to the IMPACT program, or (2) since the IMPACT program, but without a grant from the Exxon Education Foundation. Those who adopted an innovation prior to the IMPACT program are called "pre-IMPACT spontaneous adopters". We interviewed 29 of the 30 pre-IMPACT spontaneous adopters, and 36 of the 178 post-IMPACT spontaneous adopters.

In addition to these adopters, we also interviewed the following categories of respondents.

1. "Information requestors only" are those individuals who requested information about one or more IMPACT innovations, but who then took no further action. In our sample of 3,058 requestors, we interviewed 23 "requestors only" to check the validity of our mailed questionnaire responses.

Table 4-3. Types of Adopters Personally or Telephonically Interviewed, by Innovation.

Innovation	Pre-IMPACT Spontaneous Adopters (N=30)		May, 1974 and October, 1974 Grantees (N=55)		Post-IMPACT Spontaneous Adopters (N=178)		All Adopters (N=263)	
	Number Interviewed	Percent Interviewed	Number Interviewed	Percent Interviewed	Number Interviewed	Percent Interviewed	Number Interviewed	Percent Interviewed
1. EXPER SIM	3	100%	13	100%	10	30%	26	9%
2. Guided Design	19	100%	14	100%	11	28%	44	16%
3. TIPS	1	100%	11	100%	4	44%	16	6%
4. Student-to-Student Counseling	6	85%	17	100%	11	4%	34	12%
Totals	29	96%	55	100%	36	20%	120	45%

2. "Intend to adopt" are those individuals who indicated in their questionnaire that they had a definite plan to adopt one of the IMPACT innovations during 1974-75. We interviewed 20 persons (9 per cent) of the 219 "intend to adopt" in order to find out more about their plans for definite adoption of an innovation.
3. Non-adopters are individuals who indicated in their mailed questionnaire and/or interview that they have no plans to adopt one of the IMPACT innovations due to such reasons as a lack of funds, time, and/or personnel. We interviewed a sample of 30 (1 per cent) of the 3,131 non-adopting requestors in order to determine their reasons for not adopting.
4. Non-respondents did not respond to our Phase I second wave mailed questionnaire. In order to capture the complete picture of the total IMPACT requestors, and to determine the nature of the non-response bias, we interviewed a sample of 52 of these non-respondents by telephone, as explained in the previous section of this chapter.

The Interview Procedures

Most of our Phase II data-analysis (Chapter 5) deals with data from the interviews with the 120 adopters. We found that very few adopters refused to be interviewed. The response rate with grantees was 100 per cent, and only two of the spontaneous adopters refused to be interviewed.

Eighty-three per cent of the 120 adopter interviews were personal, and 17 per cent were by telephone. Of the spontaneous adopters, 65 per cent were personal interviews, and 35 per cent were by telephone.

The interview guide for the four innovations went through five revisions before it reached its present form (Appendix E). We tried to maintain comparability across the four innovations by keeping the interview questions as similar as possible. The purpose of the interview guides was to provide a certain degree of structure to the interview situation.

Many variables were measured by multiple questions; hence, we often constructed indices by combining the responses to the various questions on our Phase II coding forms (Appendix F).

PHASE III - SECONDARY RECEIVERS

Secondary receivers are individuals who have learned about an IMPACT innovation through informal communication with adopters, spontaneous adopters, and/or information requestors. Our list of secondary receivers' names came from the Phase I data-gathering, where we asked all requestors to nominate all colleagues within and outside of their institution, with whom they had talked about the innovation.

Our purpose in interviewing the secondary receivers was to assess the informal communication patterns through which the four IMPACT innovations spread out from the original set of requestors and adopters in our Phase I and Phase II, respectively.* Further, the secondary receivers may further diffuse the IMPACT innovations to yet wider audiences of tertiary receivers.

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*This is known as relational analysis, where the unit of analysis is the dyadic relationship between two sets of individuals. Here the dyadic interaction we are interested in occurs between the primary nominators and the secondary receivers.

We included all the same questions in the Phase III questionnaire as in the Phase I requestor study, plus some further questions to obtain data about the nature of the communication flows from the nominator to his nominated secondary receivers. The first part of the questionnaire (Appendix G) deals with this interaction, but Parts II and III are exactly the same as the Phase I mailed questionnaire.

We used a multi-phased sampling design in which we first selected a sample of nominators (information requestors, spontaneous adopters, and grantee-adopters), and then selected a sample of their nominees (secondary receivers) who we telephone-interviewed.

Our Phase III is a relatively minor part of the total research project, as it seeks to provide an answer to only one of the eight research questions guiding this study. Because of its relatively lesser significance, we planned the Phase III sample to be small in size. We consider the Phase III data that resulted as a type of pilot study for a yet-larger study of secondary receivers that could be done in the future.

One reason for the relatively complicated sampling design that we followed in Phase III was that we had a sampling frame of all Phase I and Phase II respondents, but did not have a sampling frame at the time of all the secondary receivers they had nominated. Accordingly, we first took a disproportionate stratified random systematic sample of information requestors (2,399), pre- and post-IMPACT spontaneous adopters (219), and all grantees (55). We selected 74 individuals (nominators) whose secondary receivers were to be telephone interviewed. The sample of 74 nominators included 52 information requestors (2 per cent of 2,399), 11 spontaneous adopters (5 per cent of 219), and 11 grantees (20 per cent of the 55 grantees) (Table 4-4).

We followed a disproportionate stratified random sampling procedure, in which every forty-fourth information requestor, every twenty-fifth spontaneous adopter, and every fifth grantee-adopter was chosen after a random starting point. The weighting factor for each stratified sub-sample* is:

		Weighting Factor
1.	Information requestors	9
2.	Spontaneous adopters	5
3.	Grantee-adopters	1

Who did this sample of 74 nominators report in Phases I and II as their secondary receivers? Of the 52 information requestors, 30 (58 per cent) had nominated 46 secondary receivers. The 11 spontaneous adopter nominators reported a total of 18 secondary receivers. The 11 grantees gave 30 names of secondary receivers (Table 4-5), out of which we selected a 50 per cent sample (of 15 secondary receivers). The weighted factor in this stage becomes:

		Weighting Factor
1.	Secondary receivers nominated by information requestors	1
2.	Secondary receivers nominated by spontaneous adopters	1
3.	Secondary receivers nominated by grantee-adopters	1/2

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*These weights are necessary because we sampled disproportionately, using a different sampling rate in each of the three strata so as to obtain a relatively greater degree of information from the nominators who were spontaneous adopters and grantees than from the requestors (who were much more numerous in our sampling frame).

Table 4-4. The Phase III Sample Selected of Information Requestors, Spontaneous Adopters, and Grantees Who Nominated Secondary Receivers.

Nominators	Total Number	First Stage Sampling Rate	First Stage Sample Number	First Stage Weighting Factor
1. Information requestors only	2,399	1/44	52	9 (44/5)
2. Spontaneous adopters (pre-and post-IMPACT)	219	1/25	11	5 (25/5)
3. Grantees	55	1/5	11	1 (5/5)
Totals	2,673		74	

Table 4-5. The Sample of Secondary Receivers Nominated by Information Requestors, Spontaneous Adopters, and Grantees in Phase III.

Nominators	First Stage Sample Number	Percent of Nominators with Any Secondary Receivers	Number of Secondary Receivers Nominated	Second Stage Sampling Rate of Secondary Receivers	Second Stage Sample Number	Total Number of Secondary Receivers Telephoned
1. Information requestors only	52	58%	46	1	46*	37
2. Spontaneous adopters	11	73%	18	1	18**	16
3. Grantees	11	66%	30	1/2	15***	15
Totals	74		94		79	68

*Of the 46 secondary receivers nominated by the information requestors, nine were already in our Phase I study of information requestors, and were dropped from Phase III.

**Of the 18 secondary receivers nominated by the spontaneous adopters, two were already in our Phase II study of spontaneous adopters, and were dropped from Phase III.

***We selected a 50 per cent sample of the 30 secondary receivers nominated by the 11 grantees.

Thus, the joint weighted factor for each pair of secondary receiver-nominator in our stratified sample is:

	Final Weighting Factor
1. Nominated by requestors only	9x1=9
2. Nominated by spontaneous adopters	5x1=5
3. Nominated by grantees	1x2=2

We found that nine of the 46 secondary receivers nominated by the information requestors were already in our Phase I study, and two of the 18 secondary receivers nominated by the spontaneous adopters had previously been interviewed in Phase II. Hence, we dropped these 11 secondary receivers, as they were also information requestors or spontaneous adopters, in order to avoid duplication of data.

We were able to telephone interview 52 of the 68 secondary receivers for a response rate of 76 per cent (Table 4-6).

We pre-tested the questionnaire with five secondary receivers, and found that telephone interviews were effective and did not create respondent resistance. The Phase III questionnaire is in Appendix G.

We began telephone interviews for Phase III on April 15, 1975, calling each individual four times; after the fourth try, he or she was considered a non-respondent. Two secondary receivers refused to be interviewed and 14 others could not be contacted in four telephone calls.

The typical interview lasted about 15 to 20 minutes.

Table 4-6. The Sample of Secondary Receivers Telephone-Interviewed in Phase III.

Nominators	Sample of Secondary Receivers	Number of Secondary Receivers Telephone-Interviewed	Response Rate	Final Weighting Factor	Weighted (Duplicated) Number of Secondary Receivers	Total Number of Secondary Receivers Nominated in Phases I and II	Sampling Rate (in percent)	Over- or Under-Representation of the Phase III Sample of Secondary Receivers (in Terms of an Index of 100 for Perfect Representation)
1. Information requestors only	37	26	70%	9	234	2,529	9.2%	86 (under)
2. Spontaneous adopters	16	14	88%	5	70	415	16.8%	137 (over)
3. Grantees	15	12	80%	2	24	161	14.9%	129 (over)
Totals	68	52	76%		328	3,105	10.5%	100

The data for the secondary receiver and his/her nominator were punched on IBM cards, so that our unit of analysis in Phase III can be either (1) the secondary receiver, or (2) the nominator-secondary receiver dyad. Both units of analysis are utilized for certain purposes in our Chapter 5.

The IBM cards for each of the 52 secondary receivers were duplicated by the final weighting factors of 9, 5, and 2 for the strata of requestors-only, spontaneous adopters, and grantees, respectively (Table 4-6), yielding a weighted sample of 328 (duplicated) secondary receivers that forms the data base for our answer to research question #2 in the following chapter. These 328 secondary receivers are somewhat under-representative of the total number of secondary receivers nominated by our "requestor only" respondents in Phase I and Phase II, while our sample is over-representative of the secondary receivers nominated by spontaneous adopters and grantees (Table 4-6).

Chapter 5

FINDINGS FROM THE RESEARCH

The purpose of this chapter is to present the research findings that bear on the eight research questions that guided the present research project. First we mention briefly some general findings about the profile of requestors and adopters of the four IMPACT innovations.

UNITS OF ANALYSIS

There are five different units of analysis utilized in the present report. We list them here in order to help the reader differentiate among them in the sections of this chapter that follow.

1. Requestors are individuals who made requests for information about the four IMPACT innovations from the inventors or subinventors.
2. Respondents are individual requestors who responded to our mailed questionnaire in November, 1974 or January, 1975, or to our telephone interview follow-up with those who had not responded to the mailed questionnaires.
3. Requests are our main unit of analysis, each consisting of an individual asking for information about one of the IMPACT innovations. Thus any given respondent can be represented by one, two, three, or four requests.
4. Responding requests are those requests for information about one of the IMPACT innovations on which we were able to obtain data from a Phase I respondent.

5. Adopters are individuals who have decided to adopt and implement one of the four IMPACT innovations.

Our main units of analysis in this chapter are requestor-respondents and responding requests, and, to a lesser extent, adopters.

SELECTED CHARACTERISTICS OF THE RESPONDENTS

By October, 1974, the 3,058 requestors of the four IMPACT innovations made a total of 4,097 requests. About 80 per cent were requestors who made single requests, and 20 per cent of the requestors made more than one request (we call them "multiple requestors").

The large population states are most heavily represented by the requestors: New York (N=355), California (N=298), Pennsylvania (N=207), Michigan (N=168), and Ohio (N=166). Our average respondent in Phase I is a male, with a mean age of about 39 to 40 years, who teaches at a coeducational college with an average student enrollment of 7,857. The requestors' colleges confer a doctorate degree in 31 per cent of the cases; 43 per cent of the requestors are at two-year or four-year colleges. Our average respondent has been at his/her present institution for about seven years. A majority (64 per cent) of our Phase I respondents have a doctorate degree.

About 57 per cent of the requestors are administrators, and 43 per cent are teaching faculty. Of the 3,344 administrators and teachers who identified their discipline, the fields of Education (N=948), Psychology (N=386), and Chemistry (N=245) were most highly represented. Administrators comprise a majority of the Phase I respondents, but a number of them also teach; out of

3,604 responding requests, 79 per cent indicated that they taught at least one course within the past year, with an average enrollment of 48 students. Out of 120 adopters interviewed, only 36 per cent (N=43) were administrators (deans, department chairmen, directors of counseling centers, etc.) as compared to 77 teaching faculty (64 per cent).

RESEARCH QUESTION #1: CHANNELS OF COMMUNICATION

Research question #1 is: What communication channels are most important at the awareness-knowledge, persuasion, and decision stages in the innovation-decision process for university professors?

A source is the originator of a message. It may be an individual, an agency, or an organization. The receiver is the individual intended to be the destination of a source's message(s). It may be an individual, or a category of individuals. A message is a stimulus about an idea that the source transmits to the receiver. The channel is the means by which a message gets from a source to a receiver. Channels physically transmit messages. The main categories of communication channels are mass media channels and interpersonal channels. Mass media channels are all those channels involving a mass medium such as a newspaper, magazine, radio, television, etc. which enable a source of one or a few individuals to reach an audience of many. Interpersonal channels are those channels involving face-to-face information exchange between a source and a receiver.

Source/Channels for Awareness-Knowledge

By far the most important source/channel* of awareness-knowledge** about the four IMPACT innovations is the IMPACT brochure from the Exxon Education Foundation. Table 5-1 shows the IMPACT brochure was most important for 54 per cent of the 3,586 requests; further, it was consistently most important across all four IMPACT innovations, for adopters as well as for the requestor-respondents; and for requestors in the same discipline as the inventor, and for those in a different discipline.

The other mass media channel, journal articles (written mostly by the inventors about their experience with the innovation), was much less frequently mentioned as a source/channel of awareness-knowledge about the four innovations.

Among the interpersonal channels, administrators (other than the department chairman) were mentioned by 13 per cent of the responding requests, department chairmen by 8 per cent, colleagues by 6 per cent, professional conference/seminar by 4 per cent, the inventor by 2 per cent, etc. (Table 5-1).

These findings as to sources/channels for all four IMPACT innovations are generally very consistent across each of the four innovations. In every case, we conclude that: Mass media source/channels are much more important than interpersonal channels in creating awareness-knowledge of the four IMPACT innovations. The IMPACT brochure is by far the most important single source/channel.

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*In the present section we often speak of "source/channel" as the source and the channel of information about the four IMPACT innovations are difficult to distinguish.

**The question asked to tap the source/channel of awareness-knowledge was: "Where or from whom did you first hear about the innovation" [that you requested]?

Table 5-1. Mass Media and Interpersonal Source/Channels of Awareness-Knowledge about the Four IMPACT Innovations, by Innovation.

First Source/Channel of Information	Percentage of Requests for Information about an Innovation				
	EXPER SIM (N=706)	Guided Design (N=1,089)	TIPS (N=788)	Student-to-Student Counseling (N=1,003)	Total for All Four Innovations (N=3,586)*
I. Mass Media Channels	59%	65%	71%	64%	65%
1. IMPACT brochure from the Exxon Education Foundation	(50%)	(55%)	(58%)	(54%)	(54%)
2. Journal articles	(9%)	(10%)	(13%)	(10%)	(11%)
II. Interpersonal Channels	39%	35%	29%	34%	34%
1. Other administrator (e.g., dean, vice-president, etc.)	(12%)	(12%)	(11%)	(17%)	(13%)
2. Department chairman	(8%)	(9%)	(9%)	(4%)	(8%)
3. Colleagues in your field or in other fields	(9%)	(5%)	(5%)	(6%)	(6%)
4. Professional conference or seminar	(6%)	(5%)	(2%)	(4%)	(4%)
5. Inventor of the innovation	(2%)	(3%)	(1%)	(2%)	(2%)
6. Research/project administration office of your institution	(2%)	(1%)	(1%)	(1%)	(1%)
III. Other source	2%	0	0	2%	1%
Total	100%	100%	100%	100%	100%

*Of the 3,698 responding requests, 112 (3 per cent) did not answer the present question.

Receiving the IMPACT Brochure

Because of the great importance of the IMPACT brochures in creating awareness-knowledge about the IMPACT innovations, we asked our responding requests to indicate how they obtained the IMPACT brochure. Table 5-2 shows that the direct mailings from the Exxon Education Foundation were most frequently mentioned (48 per cent for all four innovations combined), followed by administrators and colleagues who passed the IMPACT brochures along to the responding request (36 per cent). In Chapter 3, we described how many of the IMPACT brochures were mailed in multiple copies to college administrators, with the intention that the brochures would then be passed along to others in the institution.

Unfortunately, we were unable to obtain adequate data about sources/ channels of communication at the persuasion and decision stages in the innovation-decision process for the four IMPACT innovations. Questions to obtain such data were pretested in our Phase I mailed questionnaire survey, but were later dropped from the instrument because so few of the Phase I respondents had reached the persuasion or decision stage. We did include such questions in our Phase II interviews, and, while quantitative data are not available, our impression is that interpersonal communication from peers (that is, colleagues or fellow administrators) was most frequently cited.

Table 5-2. Mass Media and Interpersonal Channels of Communication Through Which the Exxon Brochure Was Received by the Responding Requests, by Innovation.

Channels Through Which Brochure Was Sent	The Four IMPACT Innovations				
	EXPER SIM (N=727)	Guided Design (N=1,079)	TIPS (N=760)	Student-to-Student Counseling (N=1,001)	All Four Innovations Combined (N=3,567)*
I. Mass Media Channels	46%	48%	51%	49%	48%
1. Directly through the mail from the Exxon Education Foundation	(46%)	(48%)	(51%)	(49%)	(48%)
II. Interpersonal Channels	48%	43%	46%	47%	46%
1. Administrators (e.g., dean, director of counseling center, chairman, etc.) or colleagues	(38%)	(33%)	(36%)	(37%)	(36%)
2. Research administration officials at the respondent's institution	(8%)	(7%)	(8%)	(9%)	(8%)
3. Inventor	(2%)	(3%)	(2%)	(1%)	(2%)
III. Self-Initiated Request to the Exxon Education Foundation	1%	1%	1%	1%	1%
IV. Did Not Receive the IMPACT Brochure	5%	8%	2%	3%	5%
Totals	100%	100%	100%	100%	100%

*These 3,567 responses do not include 131 responding requests (4 per cent) who did not respond to the question about the IMPACT brochure.

RESEARCH QUESTION #2: SECONDARY DIFFUSION TO PEERS

Our research question #2 is: How do the IMPACT grantees, spontaneous adopters , and requestors, communicate the four innovations through a secondary diffusion to their peers?

To answer this research question, our discussion in this section focuses on these specific sub-questions:

1. Do the IMPACT grantees, spontaneous adopters, and requestors report having diffused information about the four innovations to their secondary diffusers? Is such secondary diffusion also reported by the secondary receivers?
2. How do the responding requests who report talking with secondary receivers differ on individual and institutional variables from the responding requests who do not report talking to secondary receivers?
3. How do the primary nominators differ from the secondary receivers on individual and institutional attributes?
4. What is the nature of secondary diffusion about the IMPACT innovations?

5. *What are the "boundaries" (in terms of the characteristics of those who interact) around the communication about the IMPACT innovations from primary nominators to secondary receivers?*

6. *To what extent do the secondary receivers communicate the IMPACT innovations to tertiary receivers?*

Secondary receivers are defined as individuals who have learned about an IMPACT innovation through informal communication with adopters, spontaneous adoptors, and/or information requestors. However, we cannot always assume the information/influence flows from requestors of the IMPACT innovations to secondary receivers. Some secondary receivers knew about the innovation simultaneously, or even earlier, than the requestor. In order to minimize this problem, we excluded from our sample of Phase III secondary receivers the relatively small number of them who were also in our Phase I mail questionnaire sample as information requestors.

Does Secondary Diffusion Occur?

One of the intentions of the IMPACT program was that the requestors, grantees, and spontaneous adopters would pass along their knowledge of the four innovations to their peers. Do they?

We asked our Phase I sample of requestors for the names of other individuals with whom they had discussed an IMPACT innovation (as explained in Chapter 4): (1) within their department, (2) outside their department, but at the same institution, and (3) at other institutions. These three categories are essentially: (1) intra-disciplinary, (2) cross-disciplinary at the same university, and (3) intra- or cross-disciplinary at another university.

Despite this particular structuring of the question about diffusion of the IMPACT innovations to secondary receivers, some of the respondents did not answer it in these terms. For example, several respondents replied that they gave a seminar in their department to all the faculty about the innovation. Typically, these respondents did not provide any specific names of secondary receivers, as they had been asked to do in the questionnaire.

However, in spite of these measurement problems with the sociometric question, an approximate index of the degree of diffusion to secondary receivers was obtained for each Phase I respondent. Table 5-3 shows that about half (49 per cent) of the responding requests nominated at least one secondary receiver. Table 5-4 shows that *the typical responding request* talked with 0.92 secondary receivers about an IMPACT innovation; 3,698 of the responding requests nominated 3,392 secondary receivers. Tables 5-3 and 5-4 show that a considerable amount of secondary diffusion occurred during the first year of the IMPACT program. The extent

Table 5-3. Percentage of Responding Requests Who Talked to at Least One Secondary Receiver, by Innovation.

Location of Secondary Receiver with Whom the Innovation Was Discussed	Percentage of Responding Requests Who Talked to at Least One Secondary Receiver				
	EXPER SIM (N=760)	Guided Design (N=1,120)	TIPS (N=798)	Student-to-Student Counseling (N=1,020)	Total for All Four Innovations (N=3,698)
1. Within the responding request's department	30%	29%	29%	43%	33%
2. Outside of the responding request's department, but at the same institution	27%	18%	24%	31%	25%
3. At other institutions	6%	5%	3%	11%	6%
Any of the above	48%	40%	45%	62%	49%

Table 5-4. Number of Secondary Receivers Reported by All Responding Requests, by Innovation.

Location of Secondary Receivers with Whom the Innovation Was Discussed	Number of Secondary Receivers Reported by All Responding Requests				
	EXPER SIM (N=760)	Guided Design (N=1,120)	TIPS (N=798)	Student-to-Student Counseling (N=1,020)	Total for All Four Innovations (N=3,698)
1. Within the responding request's department	287 $\bar{X}$=0.38	472 $\bar{X}$=0.42	291 $\bar{X}$=0.36	641 $\bar{X}$=0.63	1,691 $\bar{X}$=0.46
2. Outside of the responding request's department, but at the same institution	327 $\bar{X}$=0.43	294 $\bar{X}$=0.26	293 $\bar{X}$=0.37	471 $\bar{X}$=0.46	1,385 $\bar{X}$=0.37
3. At other institutions	61 $\bar{X}$=0.08	93 $\bar{X}$=0.08	34 $\bar{X}$=0.04	128 $\bar{X}$=0.13	316 $\bar{X}$=0.09
Total number of secondary receivers	675 $\bar{X}$=0.89	859 $\bar{X}$=0.77	618 $\bar{X}$=0.77	1,240 $\bar{X}$=1.22	3,392 $\bar{X}$=0.92

of secondary diffusion was consistently greater in the case of Student-to-Student Counseling, than for the other three IMPACT innovations, EXPER SIM, Guided Design, and TIPS responding requests.

Most of the secondary receivers are located within the responding request's department, fewer are elsewhere in the same university, and fewest are at another university (Tables 5-3 and 5-4). So most secondary diffusion occurs with colleagues that are organizationally at the same horizontal level and within the same unit and discipline.

The average number of secondary receivers nominated by a responding request is greater for adopters ($\bar{X} = 2.08$) than for those who intend to adopt ($\bar{X} = 1.27$), which in turn is greater than the average number of secondary receivers nominated by responding requests who are non-adopters ($\bar{X} = 0.80$) (Table 5-5). Adopters talked to more of their colleagues about the IMPACT innovations than did intended adopters, who in turn talked to more colleagues than did non-adopters. Adopters presumably know more about the IMPACT innovations, and probably are more enthusiastic about them, leading to greater secondary diffusion activity.

There are also differences in the degree of secondary diffusion activity on the basis of degree of participation in the IMPACT program.

Table 5-5. Average Number of Secondary Receivers Reported by Responding Requests for Adopters, Those Who Intend to Adopt, and Non-Adopters.

Location of Secondary Receiver with Whom the Innovation Was Discussed	Average Number of Secondary Receivers Reported			
	Responding Requests Who Are Adopters (N=263)	Responding Requests Who Intend to Adopt (N=219)	Responding Requests Who Have Not Adopted (N=3,131)	All Responding Requests in Phase I (N=3,613)*
1. Within the responding request's department	142 $\bar{X}=1.00$	113 $\bar{X}=0.75$	959 $\bar{X}=0.40$	1,214 $\bar{X}=0.47$
2. Outside of the responding request's department, but at the same institution	112 $\bar{X}=0.86$	79 $\bar{X}=0.37$	725 $\bar{X}=0.34$	916 $\bar{X}=0.38$
3. At other institutions	66 $\bar{X}=0.67$	17 $\bar{X}=0.15$	156 $\bar{X}=0.06$	239 $\bar{X}=0.11$
Total number of secondary receivers	320 $\bar{X}=2.08$	209 $\bar{X}=1.27$	1,840 $\bar{X}=0.80$	2,369 $\bar{X}=0.96$

*Eighty-five of the 3,698 responding requests in Phase I did not answer our question about whether they were adopters, intended to adopt, or non-adopters.

Stage of Participation in the IMPACT Program	Average Number of Secondary Receivers Reported by All Primary Nominators
1. Requests only	0.76
2. Grant applicants	1.56
3. Spontaneous adopters	2.00

Spontaneous adopters, who probably have the lengthiest experience with their innovation, report more secondary receivers than grant applicants, who in turn report more secondary receivers than do "requests only".

Table 5-6 shows the degree to which the 120 adopters (who were interviewed in Phase II) conducted various diffusion activities, such as participating in personal discussions (86 per cent), writing papers about the IMPACT innovations (28 per cent), and other diffusion activities (42 per cent). Again, we see the considerable activity of adopters in engaging in secondary diffusion activities.

Now we turn to the issue of whether the secondary diffusion, reported by responding requests, is also confirmed by the secondary receivers.

Is the communication about the IMPACT innovation reported by the primary nominators (grantees, spontaneous adopters, and requestors) confirmed by the secondary receivers?

There is little doubt that this actual communication did occur, but the importance of the communication in creating knowledge-awareness

Table 5-6. Diffusion Activities by 120 Adopters of the Four IMPACT Innovations, to Secondary Receivers, by Innovation.

Innovation	Percentage of Adopters that Conducted Various Diffusion Activities			
	Personal Conversations about the IMPACT Innovation	Wrote Papers about the IMPACT Innovation	Other Diffusion Activities (such as talks at workshops, etc.)	At Least One of the Three Diffusion Activities
1. EXPER SIM (N=26)	81%	23%	58%	81%
2. Guided Design (N=44)	86%	23%	41%	86%
3. TIPS (N=16)	75%	38%	31%	75%
4. Student-to-Student Counseling (N=34)	94%	35%	35%	94%
Totals (N=120)	86%	28%	42%	86%

or in affecting adoption-decisions about the innovations is rather limited. For example, while 71 per cent of the secondary receivers in Phase III report that the primary nominator mentioned the IMPACT innovation to them, only 27 per cent of the secondary receivers indicate that the primary nominator was the first source of information about the IMPACT innovation for them.

The IMPACT brochure was the most important awareness-knowledge source of information for secondary receivers (40 per cent); it was often passed along by the department chairman, by other higher-ranking administrators (e.g., dean, director, etc.) or by colleagues, or received directly by mail from the Exxon Education Foundation.

About 24 per cent of the secondary receivers in Phase III reported they did not hear of the IMPACT innovation at all, and 2[illegible] per cent disclaimed that the primary nominator told them about one of the IMPACT innovations (although the primary nominator had reported such communication). The discrepancy in the reported communication between primary nominator and the secondary receiver might be due to forgetting by the secondary receiver, who were interviewed in Phase III some 2 to 18 months after such communication had been reported by the primary nominator.

Who Participates in Secondary Diffusion?

Our second research sub-question about secondary diffusion is:

How do the responding requests who report talking with secondary receivers differ on individual and institutional variables from the responding requests who do not report talking to secondary receivers?

In order to answer this question, we contrast (1) the 1,805 responding requests (49 per cent of the total of 3,698 responding requests) who reported talking with at least one secondary receiver, with (2) the 1,893 responding requests (51 per cent of the total) who did not talk to a secondary receiver.

Table 5-7 shows that the responding requests who reported secondary receivers:

1. Requested information about fewer of the four IMPACT innovations.
2. Had slightly longer tenure at their present institution.
3. Were slightly more innovative in their teaching methods.
4. Were slightly younger.
5. Were more likely to have earned a doctorate.
6. Were somewhat less likely to be professors than administrators.
7. Give slightly more weight to teaching in the perceived reward system.
8. Are at universities with smaller student enrollments.
9. Are at universities with lower Gourman academic ratings.
10. Are more likely to be adopters of one of the IMPACT

Table 5-7. Characteristics of Responding Requests (1) Who Reported Discussions with Secondary Receivers, Versus (2) Those Who Did Not Have Such Discussion with Secondary Receivers.

Characteristics of Responding Requests	Responding Requests Who Did Not Report Secondary Receivers (N=1,893)	Responding Requests Who Report Discussions with Secondary Receivers (N=1,805)
1. Number of the four IMPACT innovations about which the responding request had requested information	1.8 (N=1,893)	1.5 (N=1,804)
2. Years at the present institution	6.88 (N=1,821)	6.94 (N=1,741)
3. Innovativeness (number of seven teaching innovations adopted)	3.07 (N=1,328)	3.21 (N=1,306)
4. Age in years	39.9 (N=1,556)	39.6 (N=1,495)
5. Percentage with doctorate degree	57% (N=1,621)	68% (N=1,484)
6. Percentage who are administrators	55% (N=1,736)	59% (N=1,660)
7. Weight given to teaching in the perceived reward system	70 (N=1,454)	73 (N=1,504)
8. Total student enrollment at responding request's institution	8,072 (N=1,800)	7,637 (N=1,753)
9. Gourman academic rating of responding request's institution	383 (N=1,275)	372 (N=1,254)
10. Percentage adopting one of the four IMPACT innovations	4% (N=1,822)	10% (N=1,791)

innovations.

Generally, however, we find relatively modest differences between the responding requests who report secondary receivers, and those who do not.* Whether or not a Phase I requestor discusses one of the IMPACT innovations with a colleague or not does not seem to be very fully explained by personal or institutional characteristics of the requestor.

Primary Requestors Versus Secondary Receivers

Our sub-question #3 is: *How do the primary nominators differ from the secondary receivers on individual and institutional characteristics?*

For simplicity's sake, we use the term "primary nominators" to refer to our Phase III respondents who nominated the secondary receivers that we telephone-interviewed.** In comparison with the secondary receivers, the primary nominators are characterized (Table 5-8) by:

(1) A greater likelihood to request more than one of the four IMPACT innovations.

(2) Shorter tenure at their present institution.

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* Nor do we find important differences across the four IMPACT innovations, so they are not reported in Table 5-7.

** The 328 primary nominators from our Phase III are only part of the 3,698 responding requests from our Phase I, so the characteristics of the two samples (in Table 5-7 and in Table 5-8, respectively) are different.

Table 5-8. Characteristics of Phase III Primary Nominators and the Secondary Receivers to Whom They Diffused IMPACT Innovations.

Characteristics	Primary Nominators (who communicated with the secondary receivers) (N=328)	Secondary Receivers (N=328)
1. Percentage requesting more than one of the four IMPACT innovations	20%	6%
2. Years at the present institution	6.63	8.11
3. Innovativeness (number of seven teaching innovations adopted)	3.08	2.50
4. Age in years	42.5	41.4
5. Percentage with doctorate degrees	54%	50%
6. Percentage who are administrators	47%	33%
7. Weight given to teaching in the perceived reward system	82	77
8. Total student enrollment at the individual's institution	4,384	5,155
9. Gourman academic rating of the individual's institution	308	305

(3) Greater innovativeness in adopting new teaching methods.

(4) Slightly older age.

(5) A slightly higher percentage with doctorate degrees.

(6) A greater likelihood to be administrators.

(7) Greater weight given to teaching in the perceived reward system.

(8) A smaller student enrollment at their institution.

(9) A slightly higher Gourman rating for their institution.

So when we compare the characteristics of the two individuals in the primary nominator-secondary receiver dyads, we generally find some rather marked differences.

Nature of Secondary Diffusion

Our research sub-question #5 is: What is the nature of secondary diffusion about the IMPACT innovations?

The nature of the secondary diffusion can be illuminated by examining (1) the frequency of the interaction, (2) the place where the communication took place, (3) the content of the reported conversation, (4) the extent to which persuasion took place about one of the IMPACT innovations, and (5) the extent to which the secondary receivers have since adopted the IMPACT innovations.

(1) Twenty-nine per cent of the secondary receivers in Phase II say they have never discussed one of the IMPACT innovations with the primary nominator. The frequency of interaction is:

Frequency of Interaction	Percentage of Secondary Receivers
Never	29%
Once	26%
Twice	15%
Three times	12%
Four times	1%
Five times or more	18%
Total	100%

(2) Forty-two per cent of the secondary receivers interviewed in Phase III said contact with the primary nominator occurred only casually. About 21 per cent reported that it occurred at departmental or college-level meetings, and 6 per cent said it occurred through correspondence, telephone calls, or memos.

(3) The secondary diffusion that occurred seldom included successful experiences of the primary nominator with the IMPACT innovation. Mostly, the primary nominator and secondary receiver discussed the innovation in general , its teaching/counseling effectiveness, and various aspects of the IMPACT program (for example, the proposal procedures, workshops, the grant process, etc.). So the dyadic interaction between primary nominators and secondary receivers seldom included persuasive messages about the IMPACT innovations.

(4) Further, 53 per cent of the secondary receivers indicate that the primary nominator did not urge them to adopt the innovation, while only 8 per cent said such urging did occur, and 16 per cent of the secondary receivers mutually considered the possibility of adopting the innovation with the primary nominator. So very little active persuasion to adopt the innovation occurred in the secondary diffusion process.

(5) Only 6 per cent of the secondary receivers adopted one of the INPAC innovations, and most of these adopters (5 per cent) were not influenced by the INPAC program because they had adopted prior to December, 1972.

So while some degree of *information* about the INPAC innovations may have been exchanged in the secondary diffusion from primary nominators to secondary receivers, it seems that relatively little *influence* or persuasion occurred.

Boundaries in Secondary Diffusion

What are the "boundaries" (in terms of the characteristics of those who interact) around the communication about the INPAC innovations from primary nominators to secondary receivers?

Here we want to determine whether those dyadic pairs of primary nominators and secondary receivers who interact about the IMPACT innovations are homophilous* (similar) or heterophilous in their personal and institutional characteristics. For instance, do administrators interact with administrators, and professor with professors, about the IMPACT innovations? Table 5-9 shows some evidence for this homophilous tendency.

Similarly we found that homophily occurred between the dyads of primary nominators/secondary receivers on the following variables:

1. Age
2. Possession of a doctorate degree.
3. Adoption of one of the IMPACT innovations.
4. Student enrollment at the individual's institution.**
5. Weight given to teaching in the individual's perception of the institution's reward system.
6. Gourman ranking on academic quality.

In addition, we found a high degree of disciplinary homophily in the dyadic interaction that constitutes the secondary diffusion. Previously we stressed that much (about half) of the secondary diffusion

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* Homophily is the degree to which source-receiver pairs are similar in certain attributes. Heterophily is communication between unalikes.

** We found a very high degree of homophily on all of the institutional characteristics here, partly because much of the secondary diffusion occurred within the same institution.

Table 5-9. Teaching Versus Administrative Positions of Primary Nominator/Secondary Receiver Dyads.

Primary Nominator's Position	Secondary Receiver's Position: Teaching Faculty	Secondary Receiver's Position: Administrators	Totals
Teaching faculty	108 (70%)	47 (30%)	155 (100%)
Administrators (vice-presidents, deans, directors, department chairmen, etc.)	69 (42%)	95 (58%)	164 (100%)
Totals	177	142	319*

*In 9 of the 328 dyads, either the primary nominator or the secondary receiver did not indicate their teaching/administrative position.

occurred within the primary nominator's department (Table 5-3); hence this communication occurs between individuals in the same discipline. About one-third of the secondary diffusion occurred outside of the primary nominator's department, and hence was heterophilous (that is, crossed disciplinary lines). One-tenth of the secondary diffusion was with secondary receivers at other universities (than the primary nominator's); somewhat less than half of this interaction was between dyadic partners of the same discipline. So overall, more than 50 per cent of the secondary diffusion occurred between pairs of individuals in the same discipline.*

Tertiary Diffusion

To what extent do the secondary receivers communicate the IMPACT innovations to "tertiary receivers"?

We have previously reported that 49 per cent of the total number of responding requests have talked about the IMPACT innovation with at least one colleague. Out of the 328 secondary receivers that we sampled in Phase III, 38 per cent report communicating about the IMPACT innovations with at least one tertiary receiver (Figure 5-1). The average number of tertiary receivers reported by the 328 secondary receivers (in Phase III) is 1.55 (Table 5-10), a figure considerably higher than the average 0.92 secondary receivers reported by the responding requests (Table 5-3).

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* e acknowledge, of course, that a single discipline (according to our classification presented under research question #5) does not always constitute a department, although this is usually the case.

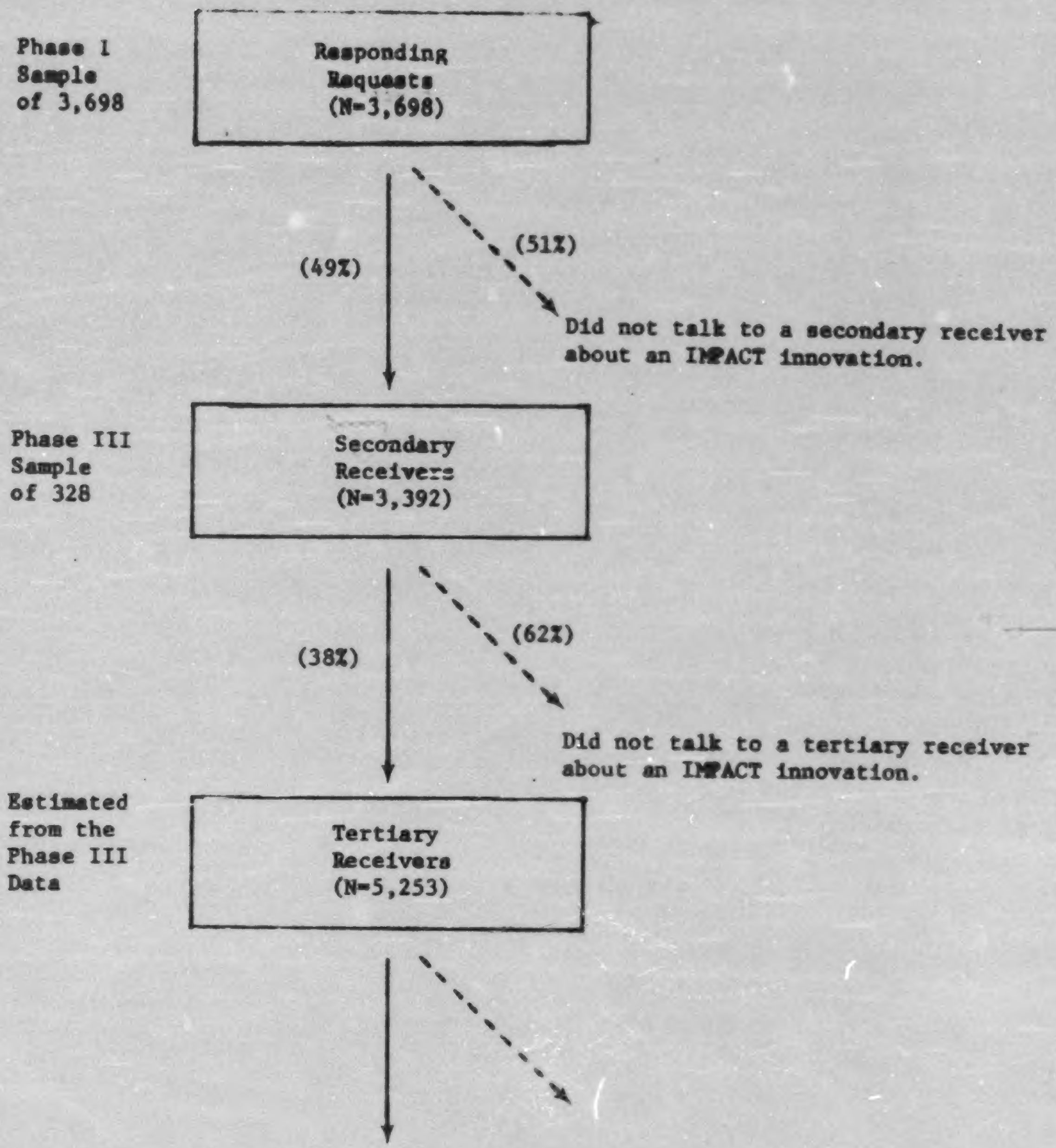
Phase I
Sample
of 3,698
Responding
Requests
(N=3,698)
(49%)
(51%)
Did not talk to a secondary receiver about an IMPACT innovation.
Phase III
Sample
of 328
Secondary
Receivers
(N=3,392)
(38%)
(62%)
Did not talk to a tertiary receiver about an IMPACT innovation.
Estimated
from the
Phase III
Data
Tertiary
Receivers
(N=5,253)

Figure 5-1. Secondary and Tertiary Diffusion about the IMPACT Innovations from Requests to Secondary Receivers to Tertiary Receivers.

Table 5-10. Extent of Tertiary Diffusion by Location of the Tertiary Receiver.

Location of Tertiary Receiver	Percentage of Secondary Receivers Talking to Tertiary Receivers (N=328)		Average Number of Tertiary Receivers Talked to
1. Within same department	32.3%		0.74
2. Within university	21.3%		0.53
3. Outside of university	5.8%		0.28
Percentage of secondary receivers talking to at least one tertiary receiver	38.0%	Average number of tertiary receivers talked to	1.55

Most of the tertiary receivers are located within the secondary receiver's department, fewer are elsewhere at the same university, and still fewer are at another university. As we reported previously in the case of secondary diffusion from responding requests to secondary receivers, the tertiary diffusion from secondary receivers takes place to tertiary receivers who are organizationally and physically close to them.

RESEARCH QUESTION #3: RESISTANCES AND BARRIERS

Our research question #3 is: What are the most important resistances and barriers to the diffusion and adoption of the four innovations?

We seek to provide answers to this question with data bearing on (1) reasons for non-adoption, (2) reasons for requesting information about the IMPACT innovations, (3) computer-dependence of the two IMPACT innovations as a barrier to their adoption, (4) compatability of the inventor's computer with the adopter's, (5) lack of knowledge of a computer language, (6) the percentage of responding requests who have adopted for computer-dependent and -independent innovations, and (7) the degree to which innovation-decisions are collective rather than individual/optional in nature.

Reasons for Non-Adoption

Table 5-11 presents the most important reasons for non-adoption of the four IMPACT innovations given by the Phase I responding requests in answer to a direct question. For the four IMPACT innovations combined, the most important reasons are:

1. Unavailability of funds to adopt.
2. Not enough time available.
3. Unavailability of specially trained personnel (for example, a computer programmer).

These three reasons for non-adoption of the unavailability of funds, time, and special personnel, are consistently the most important across the four innovations (Table 5-11). Together, these three reasons constitute 56 per cent

Table 5-11. Responding Requests' Reasons for Non-Adoption of the Four IMPACT Innovations (in order of importance), by Innovation.

Reasons for Non-Adoption	Reasons for Non-Adoption of the IMPACT Innovations				
	EXPER SIM (N=760)	Guided Design (N=1,120)	TIPS (N=798)	Student-to-Student Counseling (N=1,020)	Total for All Four Innovations (N=3,698)
1. Unavailability of funds to adopt	227 (23%)	299 (21%)	268 (23%)	355 (33%)	1,149 (24%)
2. Overly time-consuming or lack of release time	191 (19%)	346 (24%)	210 (18%)	130 (12%)	877 (19%)
3. Unavailability of trained personnel (e.g., teaching assistant, computer programmer, etc.) to implement the innovation	121 (12%)	181 (13%)	162 (14%)	166 (15%)	630 (13%)
4. Have not had adequate time to make a determination on whether to adopt	57 (6%)	111 (8%)	57 (5%)	86 (8%)	311 (7%)
5. Does not fit the subject matter of your course	78 (8%)	155 (11%)	47 (4%)	0	280 (6%)
6. Lack of support from administrators	37 (4%)	71 (5%)	49 (4%)	60 (6%)	217 (5%)
7. Collected information for others, or you are not in a position to adopt	51 (5%)	59 (4%)	59 (5%)	48 (4%)	217 (5%)
8. Lack of interest	16 (2%)	32 (2%)	22 (2%)	122 (11%)	192 (4%)
9. Have a modified or comparable innovation in use	24 (2%)	79 (5%)	54 (5%)	19 (2%)	176 (4%)
Other reasons	202 (23%)	104 (7%)	247 (21%)	100 (9%)	653 (14%)
Total number of reasons given	1,004 (100%)	1,437 (100%)	1,175 (100%)	1,086 (100%)	4,702 (100%)

of all the 4,702 reasons given.* The importance of these three reasons was confirmed by our 30 telephone interviews with non-adopting requests in March, 1975.

Table 5-11 only presents the nine main reasons for non-adoption, each of which was mentioned by at least four per cent or more of the responding requests. The additional 653 reasons, made by 14 per cent of the responding requests, include (in approximate order of importance):

1. Lack of a transferable computer program for implementing the IMPACT innovations of EXPER SIM or TIPS.
2. Doubts about the usefulness of the computer-related instructional approach (for EXPER SIM or TIPS).
3. Students' negative attitudes toward computer use (for EXPER SIM or TIPS).
4. Lack of adequate information about the IMPACT innovations.
5. Unavailability of appropriate course-related subject matter (for using Guided Design).
6. Doubts about the ability of multiple-choice questions to measure course-related content (for TIPS).
7. Doubts about the effectiveness of students as counselors (Student-to-Student Counseling).
8. Class size is too small to warrant use, as the innovation (TIPS) would be uneconomical.
9. Does not fit the needs of the responding request's institution.

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*Each responding request in Phase I was allowed to give more than one reason for not adopting if he/she wished; the 3,698 responding requests actually provided 4,702 reasons, an average of 1.27 reasons per responding request.

Reasons for Requesting Information

Another kind of insight into resistances to adoption is provided, in reverse, by the reasons our Phase I responding requests gave for requesting information about the four IMPACT innovations. We found 14 reasons were most frequently mentioned, which are classified into four main categories (Table 5-12).

Table 5-12 shows that the three most frequently-mentioned reasons for requesting information, across all four IMPACT innovations are:

1. The apparent potential of the innovation for the requestor's course/counseling situation (56 per cent).
2. In order to improve teaching/counseling effectiveness (28 per cent).
3. In order to make a grant proposal to the Exxon Education Foundation (10 per cent).

Table 5-13 shows these reasons are generally consistent across the four IMPACT innovations.

Overall, these data suggest that the main reason for requesting information about the four IMPACT innovations is their perceived relative advantage over existing teaching/counseling practice, followed by a general interest in educational innovations. Later in this chapter, in research question #7, we return to the issue of the perceived attributes of the four IMPACT innovations.

Computer-Related Issues

Several of the minor reasons given for not adopting one of the IMPACT

Table 5-12. Most Important Reasons for Requesting Information about the IMPACT Innovations, Mentioned by the Phase I Responding Requests.

Reasons Mentioned	Number of Responding Requests	Percent of Responding Requests
I. Potential Utility in Teaching/Counseling	2,255	56%
1. Will improve teaching/counseling effectiveness	(727)	(18%)
2. Will help develop course materials	(118)	(3%)
3. To compare with "my own innovation" and/or to incorporate into "my own innovation"	(272)	(7%)
4. Want to use in the course as it seems promising	(906)	(22%)
5. Use it for helping the institution's pressing problems (e.g., open admission)	(126)	(3%)
6. To stimulate students' interest	(106)	(3%)
II. Informational Search	1,113	28%
7. To find out more details about the innovation	(573)	(14%)
8. Curiosity	(155)	(4%)
9. General interest in teaching/counseling innovations	(343)	(9%)
10. Collecting it for the institution's library and/or grant office	(42)	(1%)
III. (11) To Make a Grant Proposal to the Exxon Education Foundation	402	10%
IV. Other Reasons	263	6%
12. Suggested by others to request information about the IMPACT program	(168)	(4%)
13. Help make more efficient use of resources	(83)	(2%)
14. For use of others who are members of the computer consortium or network	(12)	(0%)
Total number of reasons given by the responding requests	4,033	100%

Table 5-13. **Reasons for Requesting Information about the Four IMPACT Innovations, in Order of Importance, by Innovation.**

Reasons for Requesting Information about the Innovation(s)	Percentage of Responding Requests Giving Each Reason for Requesting Information about the IMPACT Innovations				
	EXPER SIM (N=778)	Guided Design (N=1,182)	TIPS (N=847)	Student-to-Student Counseling (N=1,226)	Total for All Four Innovations (N=4,033)
I. Potential utility in teaching/counseling	51%	55%	58%	58%	56%
II. Informational search	36%	32%	29%	19%	28%
III. To make a grant proposal	7%	8%	7%	17%	10%
IV. Other reasons	6%	5%	7%	6%	6%
Totals	100%	100%	100%	100%	100%

innovations (reviewed previously in this section) dealt with computer problems. Two of the four IMPACT innovations, EXPER SIM and TIPS, are computer-related, and we investigated the importance of this issue as a reason for non-adoption. Generally, we expected that the computer-dependence of EXPER SIM and TIPS might be a retarding influence on their rate of adoption.

We asked all responding requests in Phase 1 if they had ever used computer-assisted teaching methods. The responding requests for EXPER SIM and TIPS (our two computer-dependent innovations) are about twice as likely to have previously used some form of computer-assisted instruction as are the responding requests for Guided Design and Student-to-Student Counseling (Table 5-14).

Further, we asked all of the Phase 1 responding requests for EXPER SIM and TIPS whether or not they had ever used a computer (1) for research purposes, and/or (2) for teaching purposes. Table 5-15 shows that both adopters and non-adopters (among the responding requests) were equally experienced in computer use, so previous computer experience could hardly be a barrier to adoption of EXPER SIM and TIPS (however it is true that the non-adopters' computer experience was more likely to be for research than for teaching).

Thus, the lack of prior computer experience does not seem to be a very important barrier to the adoption of EXPER SIM and TIPS, two computer-dependent innovations.

Barriers to adoption seem not to be due to "resistance-to-computer" attitudes. However, it is possible that such variables as computer compatability, computer languages, and the unavailability of computers (machine-related reasons), and/or other administrative and institutional factors (such as funding, administrative support, colleagues' enthusiasm, etc.) might be

Table 5-14. Previous Use of Computer-Assisted Instruction by the Responding Requests for the Four IMPACT Innovations, by Non-Computer-Related and Computer-Related Innovations.

Previous Use of Computer-Assisted Instruction	Non-Computer-Related Innovations (Guided Design and Student-to-Student Counseling)		Computer-Related Innovations (EXPER SIM and TIPS)		All Four Innovations Combined	
	Number	Percentage	Number	Percentage	Number	Percentage
1. Have used	189	12%	327	26%	516	19%
2. Have not used	1,340	88%	912	74%	2,252	81%
Totals	1,529	100%	1,239	100%	2,768*	100%

*Of the 3,698 responding requests in Phase I, 930 (25 per cent) did not indicate whether or not they had used computer-assisted instruction.

Table 5-15. Previous Use of Computers for Research and/or Teaching by Responding Requests of EXPER SIM and TIPS, by Adoption.

Have Previously Used Computers	Have Adopted (N=69)	Have Intention to Adopt (N=60)	Have No Intention to Adopt (N=1,298)	All EXPER SIM and TIPS Responding Requests	
				Number	Percentage
I. Have Not Used Computers	14%	3%	14%	229	16%
II. Have Used Computers	86%	97%	86%	1,198	84%
1. For research only	(3%)	(15%)	(17%)	(192)	(13%)
2. For teaching only	(9%)	(7%)	(11%)	(154)	(11%)
3. For both teaching and research	(74%)	(75%)	(58%)	(852)	(60%)
Totals	100%	100%	100%	1,427*	100%

*Of the 1,558 responding requests for EXPER SIM and TIPS, 131 (8 per cent) did not answer the question about computer experience.

resistance factors to the diffusion and adoption of EXPER SIM and TIPS.

Computer Compatability Problems

We expected that the compatability of computers and of computer programs written in an appropriate language might be a barrier to the wider diffusion of the two computer-related innovations. We find some support for this expectation in the data from Phase I and II.

Table 5-16 shows that all but six of the 42 adopters (14 per cent) of EXPER SIM and TIPS had computers that were compatible with those of the inventors, or sub-inventor. EXPER SIM was developed by Professor Dana Main, while she was at the University of Michigan,on an IBM 360 computer. TIPS was developed by Professor Allen C. Kelley on the UNIVAC 1100 series and IBM 360 and IBM 370 series computers. These are relatively large-sized computers that tend to be found mainly at larger universities.

EXPER SIM has been adapted for use on smaller-sized computers: Art Cromer's LESS program for EXPER SIM at the University of Louisville (Chapter 3) runs on a PDP-9 computer and an HP 2000 series computer; James Ullrich at the University of Montana has written EXPER SIM for the DEC 10 computer. The availability of EXPER SIM computer programs on these smaller-sized computers seems to be an important boon to the diffusion of EXPER SIM.*

We found that only four adopters of EXPER SIM (15 per cent) did not have a compatible computer to that of the University of Michigan. These four adopters were using (or planning to use) either the University of Louisville (LESS), or the University of Montana, program, or were writing their own computer program

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*Recent telephone interviews conducted by the Center for Research on Learning and Teaching at the University of Michigan with the adopters of EXPER SIM indicated that a large number of adopters were using smaller computers such as DEC 10, XEROX Sigma 9, and other smaller computers.

Table 5-16. Compatibility of the Inventors' Computers for EXPER SIM and TIPS with the Adopters' Computers.

	Pre-IMPACT Spontaneous Adopters (N=4)		Grantees (N=24)		Post-IMPACT Spontaneous Adopters (N=14)		All Adopters (N=42)	
Innovation	Not Compatible	Compatible	Not Compatible	Compatible	Not Compatible	Compatible	Not Compatible	Compatible
1. EXPER SIM	1	2	1	12	2	8	4	22
2. TIPS	0	1	1	10	1	3	2	14
Totals	1	3	2	22	3	11	6	36

to suit the computer facilities at their respective campuses.

The 26 adopters of EXPER SIM that we interviewed in Phase II use the innovation on the following computers:

Computer	MESS Program	LESS Program	Adopter's Own Program	Totals
CDC 6500	2	0	0	2
DEC 10	1	1/2	1 1/2 (own – Ullrich's)	3
General Automation 1830	1/2	1/2	0	1
Hewlett Packard 2000F	0	1	0	1
Honeywell 2040/2020	1/2	1/2	0	1
IBM 360	1	0	0	1
IBM 360/67	1	0	0	1
IBM 360/75	2	0	0	2
IBM 360/370	1	0	0	1
IBM 370	3 1/2	1/2	0	4
IBM 370/135	1	0	0	1
IBM 1130	1/2	1/2	0	1
IBM 3701	1	0	0	1
PDP 10	0	1	0	1
PDP 11/20	0	1	0	1
SEC 10	0	1	0	1
Sigma VII	0	0	1 (own)	1
UNIVAC 70/46	1	0	0	1
UNIVAC 1110	1/2	1/2	0	1
Totals	16 1/2	7	2 1/2	26

The inventor of TIPS has provided technical assistance to TIPS grantees in getting the TIPS program "up" on their computer. Only two adopters are faced with the problem of computer incompatibility for TIPS. The 16 adopters of TIPS that we interviewed use the innovation on the following computers:

Computer	Number of Adopters
Burroughs 3500	1
CDC 6000	1
CDC 6400	1
IBM 360	5
IBM 360/370	1
IBM 370	2
IBM 370/155	1
IBM 1110/1106	1
UNIVAC 1100	2
Xerox Sigma 9	1

Previously in this section, we presented the various reasons given by our Phase I responding requests for not adopting the IMPACT innovations. Table 5-17 presents the computer-relevant reasons for non-adoption by the EXPER SIM and TIPS responding requests. These reasons combined represent about 12 per cent of the 2,179 reasons given for not adopting.

In summary, (1) a majority of EXPER SIM and TIPS adopters are using computers compatible with those of the inventors and/or sub-inventors, and (2) the availability of computer programs for smaller-sized computers for EXPER SIM, and the provision of technical assistance by the inventor of TIPS and his staff, have helped overcome problems of computer compatibility for EXPER SIM and TIPS adopters. We do not know exactly, however, how important computer compatibility problems are for potential adopters who did not adopt.

Generally we conclude that problems of compatibility of the inventor's computer with the adopter's are not a very important barrier to adoption.

Table 5-17. Computer-Related Reasons Given by Responding Requests for Non-Adoption of EXPER SIM and TIPS, by Innovation.

Computer-Related Reasons for Non-Adoption	Reasons for the Non-Adoption of EXPER SIM and TIPS		
	EXPER SIM (N=1,004)	TIPS (N=1,175)	EXPER SIM and TIPS Combined (N=2,179)
1. Inappropriate computer	67	95	162
2. Lack of transferable computer programs	31	35	66
3. Doubts about instructional usefulness of computers	13	9	22
4. Students' negative attitude toward computer use	4	0	4
Totals	115 (11%)	139 (12%)	254 (11%)

But our data bearing on this point are rather weak.

Lack of Computer Knowledge

Not only does it assist a potential adopter to have a computer compatible with the inventor's in order to adopt EXPER SIM or TIPS, but it also helps a great deal if the potential adopter knows an appropriate computer language.

Among the 42 adopters of EXPER SIM and TIPS that we interviewed, only nine (21 per cent) did not know a computer language (Table 5-18). So most of the adopters are sophisticated in a computer language.

Previously, in Table 5-15, we showed that only 16 per cent of the EXPER SIM and TIPS responding requests did not have prior experience with computers for teaching or research purposes, and that 60 per cent had used computers for both teaching and research purposes prior to their request.

Thus, we conclude that knowledge of a computer language is not an important barrier to the adoption of computer-related innovations like EXPER SIM and TIPS.

A possible problem with computer-based innovations is that the dependence on a computer program makes the innovation somewhat less flexible in use, and prevents each adopter from "re-inventing" the innovation as it is adopted and adapted to fit the adopter's local conditions. The degree of local pride in the innovation is thus less, as the professor can only say that he/she is using "Dana Main's EXPER SIM innovation", not his/her own version of "Bill Brown's Student-to-Student Counseling". We gained the impression from

Table 5-18. Knowledge of a Computer Language by the Adopters of EXPER SIM and TIPS Who Were Interviewed in Phase II.

Innovation	Pre-IMPACT Spontaneous Adopters (N=4)		Grantees (N=24)		Post-IMPACT Spontaneous Adopters (N=14)		All Adopters (N=42)	
	No Knowledge	Knowledge	No Knowledge	Knowledge	No Knowledge	Knowledge	No Knowledge	Knowledge
1. EXPER SIM	0	3	1	12	2	8	3	23
2. TIPS	0	1	4	7	2	2	6	10
Totals	0	4	5	19	4	10	9	33

our personal and telephone interviews with adopters that many of them were "prima donnas" who have considerable pride in "their" innovation; this feeling of local pride may be stronger in the case of Guided Design and Student-to-Student Counseling, because, indeed, the adopter had to a greater extent "re-invented" them. We deal with the issue of re-invention in more detail in our research question #4.

Ratio of Adopters to Requestors

Further insight into the degree to which the computer-dependence of the two IMPACT innovations (EXPER SIM and TIPS) may retard their adoption, but not awareness-knowledge about them, is provided in Table 5-19. We computed a ratio of adopters to responding requests in the form of the percentage of responding requests who have adopted. This percentage is much higher for Guided Design and Student-to-Student Counseling combined (9.06 per cent adopting) than for EXPER SIM and TIPS combined (4.43 per cent adopting).* These data suggest that individuals aware of computer-dependent innovations are less likely to adopt them than in the case of computer-independent innovations. However, it must be kept in mind that this difference between 9.06 per cent and 4.43 per cent is almost totally due to the differences between Student-to-Student Counseling (12.06 per cent) and TIPS (2.50 per cent), as EXPER SIM and Guided Design are almost identical in the percentage of responding requests who have adopted. The high rate of adoption of Student-to-Student Counseling may be due to the longer period that has elapsed since its invention, as well as its being computer-independent.

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*Although there is little difference between EXPER SIM (6.44 per cent) and Guided Design (6.33 per cent) when computed separately.

Table 5-19. Ratio of Adopters to Responding Requests, by Innovation.

	EXPER SIM	Guided Design	TIPS	Student-to-Student Counseling	All Four Innovations Combined
1. Number of responding requests	760	1,120	798	1,020	3,698
2. Number of adopters	49	71	20	123	263
Percentage of responding requests who have adopted	6.44%	6.33%	2.50%	12.06%	7.11%

We also looked into the individual and institutional characteristics of the adopters of EXPER SIM and TIPS versus Guided Design and Student-to-Student Counseling. We found few important differences, except that the average student enrollment at institutions where EXPER SIM or TIPS was adopted was larger (11,000 to 15,800, respectively) than where Guided Design or Student-to-Student Counseling was adopted (9,800 and 7,558, respectively). This size difference may be related to the nature of the innovations (for instance, TIPS is especially useful in large lecture classes, which are more likely to be found at larger-sized universities), or to the dependence of EXPER SIM and TIPS on large computers which are more often found at larger-sized universities.

Overall, we conclude that the computer-dependence of the two IMPACT innovations may be a barrier to their adoption, even though not to awareness-knowledge about them, although our evidence on this point is not very strong.

Collective Innovation Decision-Making

A generalization from diffusion research (Chapter 2) is that innovation-decisions take a longer period of time, and the rate of adoption is relatively slower, when they are made by groups or committees instead of individuals. So, a possible type of resistance/barrier to the IMPACT innovations is the degree to which adoption-decisions are made by several individuals.

Until this point in the present report, we have largely implied that only the individual college professor or counselor was involved in making the innovation-decision for the four IMPACT innovations. But Table 5-20 shows a large number of adopters reported that (in 106 of the 120 adoptions; 88 per cent) at least someone in addition to themselves was involved in the innovation-decision. In many cases, these others were colleagues, deans, department chairmen, and other administrators. In 12 per cent of the cases, only the individual was involved in the optional decision* to adopt.

We found (Table 5-20) that 61 of the 106 collective-decisions (51 per cent) were influenced by colleagues, 61 (51 per cent) by deans, 46 (38 per cent) by other administrators like the vice-president for academic affairs, etc., and 43 adoption decisions (36 per cent) were influenced by department chairmen. Inventors and sub-inventors were involved in 29 collective innovation-decisions (24 per cent). Inventors were especially important in the case of EXPER SIM and Guided Design (in the latter case, almost one-third of the total adoptions by April, 1975 occurred at West Virginia University, and, quite naturally, Professor Charles Wales has been involved as an influence on these innovation-decisions). The relative importance of the inventors/sub-inventors in the collective innovation-decisions is due to the fact that in many cases, (1) the inventor gave a seminar or workshop (in addition to the twice-a-year IMPACT workshops) that the adopter attended, and in some instances, (2) one of the inventors/sub-inventor functioned as a consultant to assist the adopter in implementing the innovation.

Our personal and telephone interviews in Phase II with the 120 adopters show that from three to five individuals are typically involved in

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*An optional innovation-decision is made by an individual regardless of the decision of other members of the system. In contrast, a collective innovation-decision is made by a consensus among individuals in the social system (Rogers with Shoemaker, 1971, p. 36).

Table 5-20. Optional and Collective Innovation-Decision for Adopters of the Four IMPACT Innovations, by Innovation.

Type of Innovation-Decision	Percentage of Adoptions				
	EXPER SIM (N=26)	Guided Design (N=44)	TIPS (N=16)	Student-to-Student Counseling (N=34)	Total for All Four Innovations (N=120)
I. Optional Decision					
1. Individual adopter alone	19%	16%	6%	3%	12%
II. Collective Decision	81%	84%	94%	97%	88%
1. Colleagues also involved	(58%)	(52%)	(62%)	(44%)	(51%)
2. Department chairman also involved	(46%)	(39%)	(31%)	(26%)	(36%)
3. Dean also involved	(46%)	(39%)	(56%)	(68%)	(51%)
4. Other administrators also involved	(27%)	(23%)	(50%)	(62%)	(38%)
5. Inventor/sub-inventor also involved	(54%)	(20%)	(6%)	(15%)	(24%)
Totals	100%	100%	100%	100%	100%

*These parenthetical sub-categories indicate types of collective-decisions that do not add up to 100 per cent as the sub-categories are not mutually exclusive. For example, 58 per cent of the EXPER SIM adoptions involving colleagues may also have involved the department chairman, dean, other administrators, and/or inventors/sub-inventors.

the innovation-decisions for the four IMPACT innovations. Student-to-Student Counseling is somewhat more likely to be a collective innovation-decision than are the three teaching innovations. Because of the group nature of these decisions, the rate of adoption may be somewhat slower than if they were optional decisions.

It is, of course, not entirely surprising that colleagues were often involved in the innovation-decisions for the IMPACT innovations. Sometimes these colleagues were jointly involved in teaching a course (or in a counseling center) and adoption of the IMPACT innovation directly affected their work.

Similarly, department heads, deans, and other administrators were often involved in making the innovation-decision, especially if funds or other institutional resources were needed. Many of the IMPACT brochures were mailed to these administrators (Chapter 3), and they subsequently passed them along to a faculty member/counselor with a suggestion for possible adoption.

The strong influence of department heads and deans (and occasionally even other administrators like the vice-president for academic affairs or the president) is shown by the fact that many of our interviewed adopters said they had the support of their department chairman and dean, and that this support was important to them in adopting the innovation.

We conclude this section with two conclusions.

1. Most of the adoption-decisions for the four IMPACT innovations may be collective rather than individual, involving colleagues, administrators,

and inventors.

2. *Administrators' support for the IMPACT innovations is a rather strong influence on the adopters' innovation-decisions*.

RESEARCH QUESTION #4: MODIFICATION, EXPANSION, AND RE-INVENTION

Our research question #4 is: To what extent are the four innovations modified (such as being simplified or changed completely) in the process of their diffusion and implementation?

On the basis of reading the research literature on the diffusion of innovations, one would gain the impression that the innovation is invariant; that is, EXPER SIM as used by Professor A is exactly the same as that developed by Professor Dana Main at the University of Michigan for her Psychology 210 class. This is partly a false assumption. Our Phase II interviews with adopters in the present research project indicate that a correct description of the typical innovation adoption-decision is usually one of varying degrees of expansion and modification of the four IMPACT innovations, in some cases perhaps almost amounting to "re-invention" of the innovation.

What is Modification, Expansion, and Re-Invention?

First, let us distinguish between modification, expansion, and re-invention.

1. Modification is the degree to which the adopters of an innovation change the original innovation into a somewhat different form.
2. Expansion is the degree to which the adopters of an innovation add newer elements to the original innovation.
3. Re-invention is the degree to which an innovation is completely changed by its adopters after its original invention.

Modification may take several forms, as we found in our analysis of the Phase II interview data:

1. Modification of the computer program, when a new program is written to suit machine capacity and/or language facility.
2. Modification in the contents of an innovation, whereby new materials are prepared in order to suit the particular subject matter of the adopter. Such modification occurred for all four IMPACT innovations, although to a lesser degree for Student-to-Student Counseling.
3. Modification by changing the format, procedures, and/or manner of presentation, whereby the adopters make suitable and necessary changes in the way they use the innovation. For example, Guided Design is used by some adopters only in part of their course, in addition to using a lecture style of teaching, as these adopters do not find that open-ended small-group problem-solving is appropriate for teaching all of their course.

Expansion can occur when the innovation, as prescribed by the inventor, is extended by the adopter, creating new and/or additional models (EXPER SIM), projects (Guided Design), multiple-choice surveys (TIPS), and counseling services (Student-to-Student Counseling). Newer features may be added to the original innovation; for example, many adopters of Student-to-Student Counseling have added more counseling services and topics than just study skills and college adjustment. One adopter stated: "Student life is not so segmentalized as the peer counseling approach of Dr. Brown might seem to indicate. It is an open system which has personal, social, and, many times, very serious individualistic issues that affect the study habits and skills of the student." Some of the expansions of Student-to-Student Counseling consist of sex counseling, employment counseling, counseling on personal and social issues, etc. Another type of expansion is illustrated by one adopter who expanded the peer counseling program (in collaboration with his university's student health center, student activity center, and open-university unit) to social, personal, and political areas of college life and family life. This adopter is now authorized to teach credit courses (through the study skill center and college of education) on how to be a peer counselor. Courses are taught in which the trainee-counselors get training for a year prior to starting as peer counselors.

Re-invention occurs when the adopter completely changes the format of the innovation. Typically the adopter gives a different name to the original innovation after its further development. We encountered very few examples of re-invention in the present research project; one illustration of re-invention is detailed later in this section, the re-invention of TIPS as "RSVP" at Miami-Dade Community College.

Past research on innovation in organizations has assumed that a new technological idea enters the system from external sources, and then is adopted (with relatively little change or adaptation in the innovation) and implemented as a part of the organization's on-going operations.

In actuality, many innovations may go through extensive revision in the process of their adoption and implementation, and may almost be re-invented by the organization. For example, Charters and Pelligrin (1973) found that in public schools, the innovation of "differentiated staffing" (an idea meant to encourage the hiring of both a variety of teachers and para-professional teaching aides, and assigning them to classroom tasks on the basis of their skills and interests) was little more than a vague word to most school staff. The innovation meant widely different staffing policies and assignments to most individuals, and its substantive meaning was actually assigned by the school officials and teachers only as the idea was being implemented. "The innovation was to be invented on the inside, not imported from the outside" (Charters and Pelligrin, 1973).

So adopters may often adopt not a specific blueprint for an innovation, but a general concept whose operational meaning gradually unfolds in the process of adopting and implementing the new idea.

By our rather strict definition and measurement of re-invention, relatively little of it occurred for the four IMPACT innovations. But we stress that a great deal of what we herein call "expansion" and "modification" actually occurred in the process of adopting the four IMPACT innovations.

EXPER SIM

We asked the following questions in our Phase II interviews with adopters of EXPER SIM:

1. How closely do you follow, or do you plan to follow, Dana Main's MESS program/or Art Cromer's LESS program?
2. Have you used the MESS, LESS, or other models, or have you written your own?
   (a) If borrowed: (1) Which ones? (2) Were modifications made?
   (b) If written, what is the model?

Among the EXPER SIM grantees and spontaneous adopters only a small per cent (24 per cent) are using only Dana Main's models or Arthur Cromer's models (Table 5-21). Modification of EXPER SIM has occurred primarily in the design of models tailored especially to suit the subject matter of the adopter's course. One reason such modification is essential is because only 38 per cent of the EXPER SIM adopters are in psychology. Most are in such diverse fields as chemistry, biology, political science, sociology-demography, english literature, geography, education, mathematics, and

Table 5-21. Summary of the Extent of Modification, Expansion, and Re-Invention of EXPER SIM by Adopters (N=26).

I. MODIFICATION	
1. Modifications of the Computer Program (New Computer Programs)	
(1) Written for DEC 10 system	15 %
(2) Adapted to the resource sharing system of PDP 11/45	4 %
(3) Use MESS and/or LESS	81 %
Total	100 %
2. Modification in the Contents of the Innovation (New Simulation Models)	
(1) Using Main/Cromer models only	24 %
(2) Using own models in conjunction with Main/Cromer models	40 %
(3) Using self-written models only	36 %
Total	100 %
II. EXPANSION	None
III. RE-INVENTION	None

physics. For this reason many adopters (36 per cent) have developed, or plan to develop, entirely their own models. About 24 per cent of the adopters use, or have plans to use, only models designed by Dana Main and/or Arthur Cromer, while 40 per cent of the adopters use their own models in conjunction with Dana Main's and/or Arthur Cromer's.

Two adopters have re-written the EXPER SIM computer program to suit their particular computer capacity and facilities, but are using models developed either at the University of Michigan or the University of Louisville by Professors Main or Cromer.

Despite these modifications in the innovation of EXPER SIM, the main concept is unchanged and intact. Hence, there is no re-invention of EXPER SIM, unless one would consider Arthur Cromer's rewriting of Dana Main's MESS computer program into LESS as a particular form of re-invention.*

One example of the modification of EXPER SIM is provided by the development of WRIST ("Wabash Research Investigation Simulation Teacher") by Professor Philip Spelt, a 1974 IMPACT grantee at Wabash College, Indiana. WRIST was developed when Spelt found that the LESS program for EXPER SIM was inappropriate for the Digital Equipment Corporation's PDP 11/45 computer at Wabash College. So he wrote WRIST in BASIC language in early 1975. It is a modification, rather than a re-invention, according to our definitions, as the basic idea of EXPER SIM has not been changed.

Professor Spelt has also produced another modification, in the form of a new EXPER SIM model, called T-MAZE, which simulates animal learning.

Guided Design

All adopters of Guided Design were asked the following questions:

1. How closely do you follow, or do you plan to follow,

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*There are also a few other attempts where the MESS computer program is rewritten to suit smaller computers: DEC 10 system, PDP 10, and others.

Dr. Wales' systems design and projects, e.g., "Bridge Freezes Before Road Surface?" Do you use his materials?

2. Have you borrowed a project similar to Professor Wales'?
   (a) From whom? (Please give name, department, and institution)
   (b) What is the project?
   (c) Have you made modifications of it?

3. Have you prepared your own project(s)? Please describe it (them).

Among the grantees and spontaneous adopters of Guided Design, a majority (50 per cent) are using, or will use, a course based entirely upon self-created Guided Design projects (Table 5-22). This type of modification is necessary because Guided Design has been adopted by professors in such widely different disciplines as political science, physical sciences, biology, philosophy, counseling and rehabilitation, and business administration, as well as engineering. Another 34 per cent of the adopters are using a combination of Dr. Wales' projects and their own (and others') materials. Only 17 per cent are using Dr. Wales' Guided Design projects exclusively.

As we showed in Chapter 3, Guided Design was diffused widely within the inventor's university prior to spreading outside of this system. Most of the spontaneous adopters are pre-IMPACT knowers at West Virginia University. These individuals developed materials for their use of Guided Design with constant help and consultation from Dr. Wales. Hence, these uses are very similar to Dr. Wales' in terms of techniques and format of presentation. Wider expansion or modification of Guided Design occurred among pre-IMPACT spontaneous adopters at institutions other than West Virginia University.

An example of expansion is provided by one adopter who developed a hybrid form of Guided Design at the Engineering Department of Wichita State University. He has prepared a series of case studies for use in graduate-level engineering courses that deal with certain aspects of

Table 5-22. Summary of the Extent of Modification, Expansion, and Re-Invention of Guided Design by Adoptors (N=44).

I.	**MODIFICATION**	
	Modification in the contents of the innovation	
	(1) Using Wales' projects alone	17 %
	(2) Using Wales' and self-written projects	26 %
	(3) Using Wales', self-written, and projects of a third party	7 %
	(4) Using self-written projects only	50 %
	Total	100 %
II.	**EXPANSION**	
	(1) Added case study method to the Guided Design study materials for use at graduate-level teaching	2 %
	(2) Use only Wales' materials	98 %
	Total	100 %
III.	**RE-INVENTION**	None

Professor Wales' Guided Design. So this adopter has expanded the original version of Guided Design by adding the case study method to the existing Guided Design system.

A large number of the Guided Design spontaneous adopters have attended the various workshops conducted by Professor Wales around the country, or heard him speak at various professional meetings. So exposure to Guided Design philosophy is relatively high among these spontaneous adopters.

TIPS

We asked the adopters of TIPS these questions:

1. How closely do you follow, or plan to follow, Professor Kelley's design to TIPS?
2. Have you used any other program (e.g., ChemTIPS, RSVP)? If so, please give us the name, department, and university where you obtained this program.

Among the 16 adopters of TIPS, 75 per cent have written their own multiple-choice question surveys and other materials for using TIPS, as their discipline is not economics (Table 5-23). Some 25 per cent are using Kelley's materials, along with their own (an average adopter uses 6 to 7 multiple-choice surveys during the usual school term).

We found 85 per cent of the adopters were assisted by Professor Kelley and his staff in installing TIPS on their computer system. Thus, modifications of the TIPS computer program are minimal.

An example of expansion of TIPS comes from the University of Wisconsin-Madison, where TIPS was originally developed by Dr. Kelley. Dr. Bassam Shakhashiri has modified the contents of TIPS to suit the subject matter of chemistry, and in the process he expanded the notion of TIPS. He uses TIPS as one teaching technique among a package of multi-media student-learning aids, like tutorials, audio and visual tapes, sample tests,

Table 5-23. Summary of the Extent of Modification, Expansion, and Re-Invention of TIPS by Adoptors (N=16).

I. MODIFICATION		
1. Modification in the Content of the Innovation (New computer program).		
(1) Using Kelley's version of computer program	75	%
(2) Using modified computer program with help of Kelley	12.5	%
(3) Using ChemTIPS but wrote own computer program	12.5	%
Total	100	%
2. Modification in the Content of the Innovation (New materials written).		
(1) Using Kelley's and own materials	25	%
(2) Using only self-created materials	75	%
Total	100	%
II. EXPANSION		
(1) Added TIPS as one of a package of teaching methods (ChemTIPS)	6	%
(2) Using Kelley's version of TIPS	94	%
Total	100	%
III. RE-INVENTION		
(1) Used TIPS, discontinued it, and then developed own method, including computer program	6	%
(2) Using Kelley's version of TIPS	94	%
Total	100	%

exercises, etc. Professor Shakhashiri calls his approach "ChemTIPS". Two spontaneous adopters are using a modified version of ChemTIPS, in which the computer program is made more appropriate for smaller-sized computers.

One of the clearest examples of re-invention occurred for TIPS at Miami-Dade Community College, where TIPS was initially adopted in both on-campus and open-college courses in January, 1972, a year before TIPS became part of the IMPACT program. Dr. Kelley assisted the staff at Miami-Dade Community College in adopting TIPS. The two individuals involved most directly with TIPS were J. Terrence Kelly, Administrative Assistant to the President of the College, and Dr. Kamala Anandam, Research Coordinator. By September, 1972, however, Miami-Dade Community College had discontinued the use of TIPS, and had re-invented "RSVP".

Drs. Anandam and Kelly indicated their college: "First had the TIPS program running at Miami-Dade, but have done some reprogramming, altered the system, and changed its name to RSVP (Response System with Variable Prescriptions)."

By 1974, the Miami-Dade staff were using RSVP in their courses on the management of learning that are taught via radio/television in an open-college system. At the time of our latest inquiry, RSVP was used in six courses offered through the Miami-Dade Open College with an enrollment of 1,450 students, and the RSVP system was being used on-campus in four courses with 590 students.

By late 1974, the RSVP system was in use also at Cleveland State University. The Miami-Dade staff provided consultation on implementation of

RSVP at Cleveland State.

One reason for the relatively few modifications in the computer program for TIPS is the gatekeeping* role played by Professor Kelley, who is very concerned about maintaining proper quality control over TIPS as adopted by others. He feels that rapid diffusion and a great number of adoptions of a questionable quality may lead to more discontinuances.

So one of the variables affecting the degree of modification of an innovation is the personal policy of the inventor, as well as whether the innovation is computer-dependent or not.

Student-to-Student Counseling

Using students to counsel other students is not entirely a new idea. Many colleges rely upon upper class-level students to counsel freshmen, most commonly in the area of personal-social adjustment as dormitory residents. However, these efforts tend to be relatively unsystematic and haphazard. Each freshman is not likely to avail himself/herself of these services. In order to maximize the effectiveness of student counselors, Dr. Brown recommends: (1) extensive training of student counselors through a 40 hour course, (2) utilization of role-playing, lectures, discussions, demonstrations in such training, etc., (3) the opportunity for self-evaluation of student counselors through recorded, video-taped sessions, and (4) learning the principles of student counseling from other trained student counselors. The original version of Brown's approach heavily emphasized the role of student counselors for study skills and academic adjustment, with counseling usually provided in counseling centers and/or testing centers, study habit clinics, etc. In addition Professor Brown provides materials and manuals to train student counselors and tests to measure students' study skill improvement. Professor Brown recommends these materials for adopters of Student-to-Student Counseling.

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*Gatekeeper is an individual located in a communication network structure so as to control the flow of messages.

The extent of modification, expansion, and re-invention of the innovation is thus somewhat different from the other three IMPACT innovations.

We asked the adopters:

1. How closely do you follow or plan to follow Professor Brown's Student-to-Student Counseling design?
2. Do you use his printed materials, such as:
   (a) Student Evaluation Test?
   (b) Counselors Manual?
   (c) Others? ______________________________
3. Did you prepare materials for your student counselors to use in counseling other students? What are they?
4. Have you made any modifications in Professor Brown's approach to Student-to-Student Counseling?

We found that a majority of the 34 adopters use Dr. Brown's materials.

Dr. Brown's Materials	Percentage of Adoptors Using
1. Student Counselors Handbook	62 %
2. Guide to Effective Study	53 %
3. Student Study Skill Evaluation Tests	65 %

Considerable modification has taken place in the training materials for the student counselors. As compared to Dr. Brown's recommendation of 40 hours' training for the student counselors, an average of 44 hours are devoted to training by the adoptors who responded to this question.

The strategies and methods of training the student counselors are also modified somewhat by the adoptors from the methods recommended by

Dr. Brown.

Methods of Training Student Counselors	Percentage of Adoptors Using
1. Use of role-playing	62 %
2. Self-evaluation by student counselors	59 %
3. Use of experienced peer counselors as trainers for new student counselors	47 %

So by no means do all adoptors of Student-to-Student Counseling follow exactly these three training methods recommended by Dr. Brown (Table 5-24).

Student-to-Student Counseling program a la Brown is heavily oriented toward improving study skill habits. We found considerable expansion has taken place in respect to other counseling services that are included along with the study skills counseling.

Types of Counseling Services Provided	Percentage of Adoptors Using
1. Study skills	88 %
2. Personal and social problems	68 %
3. Orientation to college	76 %
4. Vocational guidance	44 %
5. Educational program planning	53 %
6. Subject matter counseling	9 %
7. Psychological test interpretation	18 %
8. Others	35 %

Not all student counseling occurs in counseling and testing centers, as Brown recommends. Residence halls (35 per cent), instructional departments (29 per cent), study habit clinics (29 per cent) are locales, in addition to testing and counseling centers (35 per cent). As one adoptor argued: "The choice of a place or locale for peer counselors is as crucial as the practice of peer counseling. We find that counseling centers

Table 5-24. Summary of the Extent of Modification, Expansion, and Re-Invention of Student-to-Student Counseling by Adoptors (N=34).

I. MODIFICATION	
1. Modifications in the Contents of the Innovation (new materials used for training)	
(1) Brown's materials are used to train student counselors	60 %
(2) Self-prepared training materials are used	40 %
Total	100 %
2. Materials used for testing the students who are counseled	
(1) Brown's materials are used	60 %
(2) Self-prepared testing materials are used	40 %
Total	100 %
3. Techniques/methods of training	
(1) Use of at least one of Brown's three techniques/methods of training	66 %
(2) Used none of Brown's three techniques/methods	34 %
Total	100 %
II. EXPANSION	
1. Study skills only	50 %
2. Expanded types of counseling by student counselors	50 %
Total	100 %
III. RE-INVENTION	
1. Student counselors help teach credit courses on counseling techniques	3 %
2. Use of student counselors as para-professionals in the community	3 %
3. Use of Brown's version of Student-to-Student Counseling	94 %
Total	100 %

are not very conducive, for many reasons, to many types of counseling."

So expansion has taken place in the role of student counselors, and in increased accessibility to the student counselors by locating them in a variety of locations convenient for students.

Peer counseling is such a general type of innovation that it is difficult to break from the idea in any specific way that could clearly be labeled as re-invention. Two such cases of re-invention are included in Table 5-24; one was described previously in this section, and the second is a novel use of student counselors to counsel in the off-campus community.

Conclusions

We seek to summarize this section on research question #4 in the following conclusions.

1. Despite considerable modification in the format, presentation, computer programs, and illustrative materials of the four IMPACT innovations by adoptors, these ideas are mainly adopted with little or no expansion and/or re-invention. In sum, a great deal of change (especially modification) actually occurs in the process of adopting the four IMPACT innovations.

2. Certain of the modifications in the four IMPACT innovations are caused by their adoption by individuals in different disciplines than the inventor's. About 30 per cent of the adoptors of the three teaching innovations are in the same discipline as the inventors, and approximately 85 per cent of the adoptors of Student-to-Student Counseling are in counseling and/or education, as is Professor Brown.

3. The nature of the innovation, as well as the policy of the inventor, are factors in determining the degree to which modification,

expansion, and/or re-invention of the innovation occurs. Figure 5-2 depicts the approximate position of the four innovations on a continuum of generality/specificity as subjectively rated by the authors. The general nature of Student-to-Student Counseling greatly affects the degree of modification, expansion, or re-invention that is possible. The innovation is so flexible that it is difficult to say exactly where Student-to-Student Counseling a la Brown begins and stops.

Guided Design is more specific, as Dr. Wales has detailed outlines of its philosophy and objectives. EXPER SIM and TIPS are the most specific of the four IMPACT innovations, in part due to their computer-dependence. Hence they are more likely to be modified, expanded, or re-invented, or at least such changes are more likely to have been measured by us in the present investigation.

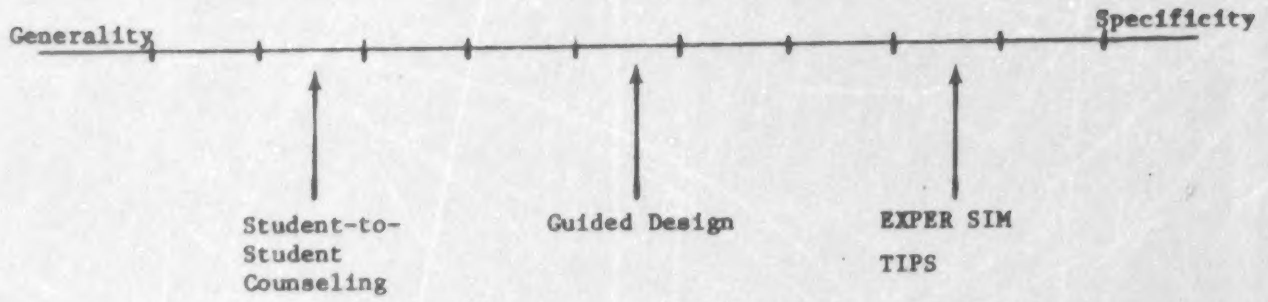
Generality
Specificity
Student-to-
Student
Counseling
Guided Design
EXPER SIM
TIPS

Figure 5-2. **Approximate Location of the Four IMPACT Innovations on a Continuum of Generality and Specificity of the Innovation.**

RESEARCH QUESTION #5: CHARACTERISTICS AND MOTIVATIONS OF REQUESTORS, APPLICANTS, AND SPONTANEOUS ADOPTERS

Research question #5 is: What are the characteristics and motivations of the IMPACT requestors, applicants, grantees, and spontaneous adopters?

Requests, Applicants, Grantees, and Spontaneous Adopters

Our basic approach in seeking to answer this research question is to determine whether such variables as academic rank, discipline, perceptions of the reward system, etc., differ for the sub-audiences for the IMPACT program (for example, requests, grant applicants, and spontaneous adopters). We essentially look at each such category as representing a stage of participation in the IMPACT program from (1) requesting information about it, (2) applying for an IMPACT grant, and (3) adopting the innovation.

Table 5-25 shows the number and percentage of individuals at each of these three stages of participation in the IMPACT program. There are differences on the basis of innovation, in the proportion of responding requests who made grant applications, ranging from a high of 9 per cent for EXPER SIM and Student-to-Student Counseling, to a low of 5 per cent for Guided Design (this is partly a function of the large number of requests, 1,120 for this innovation). Likewise, 10 per cent of the 1,020 Student-to

Table 5-25. Stage of Participation in the IMPACT Program, by Innovation.

Participation in the IMPACT Program	EXPER SIM		Guided Design		TIPS		Student-to-Student Counseling		All Four Innovations Combined	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
1. Requests only	652	86%	1,008	90%	735	92%	829	81%	3,224	87%
2. Grant applicants (including applicants only, workshop attendees, and grantees	72	9%	55	5%	53	7%	86	9%	266*	7%
3. Spontaneous adopters **	36	5%	57	5%	10	1%	105	10%	208	6%
Totals	760	100%	**1,120**	100%	798	100%	**1,020**	100%	**3,698**	100%

* The number of grant applications shown here is not identical with the number shown in Table 3-3 because more grant competitions were included in the latter.

** The 208 spontaneous adopters also include 16 individuals who made grant applications to the Exxon Education Foundation (but who were not awarded grants).

Student Counseling requests are spontaneous adopters (N=105), but only 1 per cent of the TIPS requests are spontaneous adopters (N=10).

second type of classification that we utilize in many of the tables in the present section is on the basis of stage in the innovation-decision process: (1) non-adoption, (2) intend to adopt during the 1974-75 academic year, and (3) adoption.

These two classifications are obviously highly interrelated, but they are not the same. For instance, all of the spontaneous adopters are adopters, but some of the adopters are not spontaneous adopters (21 per cent are grant applicants).

Stage in the Innovation-Decision Process	Participation in the IMPACT Program		
	1. Request only (N=3,141)	2. Grant applicant (N=266)	3. Spontaneous adopter (N=208)*
1. Non-adopter	94% (N=2,953)	69% (N=183)	0
2. Intend to adopt	6% (N=188)	10% (N=27)	0
3. Adopter	0	21% (N=56)	100% (N=208)
Totals	100%	100%	100%

In most of the remainder of this section, we shall present selected characteristics of individuals (1) at the three stages in the innovation-decision process, and/or (2) at the three stages of participation in the IMPACT program. The selected characteristics that we utilize to answer research question #5 are:

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*Of the 3,698 responding requests in Phase I, 89 (2 per cent) did not indicate their participation in the IMPACT program. Most of those 89 are probably "requests only".

1. Single versus multiple requests.
2. Discipline.
3. Academic and administrative rank.
4. Size of the institution (in terms of student enrollment).
5. Perceptions of the reward system for teaching.
6. Gourman ranking of university academic quality.
7. Other personal characteristics like age, years at the present institution, enrollment in the largest class taught, general innovativeness, and secondary diffusion activity.

Finally, we investigate grantee versus non-grantee applicants on these same variables, and then consider motivations for requesting information about the IMPACT innovations on the basis of stage of participation in the IMPACT program.

Single Versus Multiple Requests

The unit of analysis in most of this chapter, and especially for research question #5 is the information request, rather than the requestor. Certain of our Phase I respondents requested information about only one of the IMPACT innovations: they are termed "single requests". Other Phase I respondents requested information about two, three, or four IMPACT innovations; they are called "multiple requests".

The percentage of all responding requests* that were multiple differ on the basis of the innovation.

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* The unit of analysis here is each individual request, even for the category of "multiple requests".

Innovation	Percentage Single Requests	Percentage Multiple Requests	All Requests
1. EXPER SIM	58%	42%	100%
2. Guided Design	59%	41%	100%
3. TIPS	51%	49%	100%
4. Student-to-Student Counseling	82%	18%	100%
All Four Innovations	64%	36%	100%

There is a much lower degree of multiple requesting for Student-to-Student Counseling, as we might expect because it is uniquely a counseling innovation. The other three IMPACT innovations are all teaching innovations, and so multiple requesting of them is more likely.

The average number of requests made is least for adopters, more for those who intend to adopt, and greatest for non-adopters.

Stage in Innovation-Decision Process	Average Number of Requests Made
1. Non-adopters (N=3,1[illegible]1)	1.7
2. Intend to adopt (N=21[illegible])	1.4
3. Adopters (N=263)	1.3

These differences in the average number of requests made by stage in the innovative-decision process are consistent across the four IMPACT innovations.

Multiple requests are less likely to adopt (or intend to adopt) than are single requests.

Stage in Innovation-Decision Process	Single Requests (N=2,290)	Multiple Requests (N=1,323)
1. Percentage who are non-adopters	82%	94%
2. Percentage who are adopters or who intend to adopt	18%	6%
Totals	100%	100%

This difference is consistent across the four IMPACT innovations.

Is the size of the individual's institution, as measured by student enrollment, related to the number of requests? There are only slight differences, with the highest percentage of multiple requests at the middle-sized institutions (Table 5-26). Wider differences in the percentage of multiple requests by school size occurs for specific innovations, and the trend is not consistent across the four IMPACT innovations.

1. For the two computer-related innovations (EXPER SIM and TIPS), respondents associated with smaller-sized institutions are more likely to make multiple requests.

2. For Guided Design, the per cent of multiple requests is highest in moderate-sized institutions.

3. For Student-to-Student Counseling, the per cent of multiple requests increases with the size of the institution.

Table 5-26. Percentage of Multiple Requests by Student Enrollment at the Individual's Institution, by Innovation.

Student Enrollment	Percentage of Multiple Requests				
	EXPER SIM (N= 729)	Guided Design (N= 1,071)	TIPS (N=771)	Student-to-Student Counseling (N=982)	All Four Innovations Combined (N=3,553)*
1. Small (5,000 students or less)	67%	40%	54%	16%	36%
2. Medium (5,001 to 9,999 students)	43%	48%	45%	18%	38%
3. Large (10,000 students or more	35%	38%	46%	27%	37%
All requests	42%	41%	49%	18%	36%

* Of the 3,698 responding requests, 145 (4 per cent) did not indicate their institution, so data are unavailable as to their student enrollment.

Discipline

Table 5-27 shows the discipline of the responding requests for the four IMPACT innovations. The frequency of requests for each discipline varies widely from innovation to innovation. Table 5-28 presents the three leading disciplines for each innovation, a more simplified version of the more detailed data in the previous table. Overall, education ranks in first place for Guided Design, TIPS, Student-to-Student Counseling, and for all four innovations combined. More than one in four of all responding requests are in education. Psychology is the most frequently-requesting discipline for EXPER SIM, and it is in second place for Student-to-Student Counseling, and for all four innovations combined.

The inventor's discipline (underlined in Table-5-28) is related to the discipline of large numbers of the responding requests. For example, Professor Dana Main is a psychologist and her innovation, EXPER SIM, is most frequently requested by psychologists. A similar pattern can be observed for TIPS and Student-to-Student Counseling, and even for Guided Design, if all engineering departments were grouped together, instead of regarded as 13 different departments as in Table 5-27, the 139 engineering requests would rank in second place behind education (in Table 5-28).

The mailings of IMPACT brochures by the Exxon Education Foundation, described in Chapter 3, to certain disciplines undoubtedly influenced the relative frequency of requests from various disciplines.

Table 5-27. Discipline of Responding Requests, by Innovation.

Discipline	Number of Responding Requests				
	EXPER SIM (N=704)	Guided Design (N=1,038)	TIPS (N=732)	Student-to-Student Counseling (N=872)	All Four Innovations Combined (N=3,346)
I. Art and Humanities	(34)	(106)	(70)	(88)	(298)
1. American culture and American studies	0	2	0	4	6
2. Archaeology	1	0	0	0	1
3. Art	0	3	1	1	5
4. English	11	26	14	28 3rd	79
5. History	14	30	29	26	99
6. Humanities (general)	1	6	7	1	15
7. Languages	2	5	1	8	16
8. Linguistics and psycholinguistics	0	2	1	1	4
9. Literature and comparative literature	2	8	8	12	30
10. Philosophy	3	19	8	6	36
11. Theatre and drama	0	5	1	1	7
II. Social Sciences	(241)	(173)	(173)	(173)	(760)
1. Anthropology	6	5	1	2	14
2. Economics and agricultural economics	15	27	65 3rd	9	116
3. Mass communication and speech communication	4	6	4	6	20
4. Pathology and speech pathology	1	1	2	1	5

Discipline	Number of Responding Requests				
	EXPER SIM (N=704)	Guided Design (N=1,038)	TIPS (N=732)	Student-to-Student Counseling (N=872)	All Four Innovations Combined (N=3,346)
II. Social Sciences (cont.)					
5. Political science	20	24	16	9	69
6. Psychology	$145^{\underline{\text{1st}}}$	64	53	$124^{\underline{\text{2nd}}}$	$386^{\underline{\text{2nd}}}$
7. Social science (general)	7	10	5	6	28
8. Sociology	39	31	25	13	108
9. Urban planning and urban and regional planning	4	5	2	3	14
III. Natural Sciences	(188)	(325)	(263)	(51)	(827)
1. Aeronomy and planetary atmospheres; atmospheric and oceanic sciences	1	0	1	1	3
2. Astronomy	1	1	0	0	2
3. Biology (biology, cellular and molecular, entomology, medical and biological illustration, microbiology, and zoology	23	37	40	14	114
4. Botany	1	10	1	2	14
5. Chemistry, medicinal chemistry, and biological chemistry	$58^{\underline{\text{3rd}}}$	$93^{\underline{\text{2nd}}}$	$84^{\underline{\text{2nd}}}$	10	$245^{\underline{\text{3rd}}}$
6. Ecology and environmental sciences	4	9	1	0	14
7. Geography	3	7	4	1	15

Discipline	Number of Responding Requests				
	EXPER SIM (N=704)	Guided Design (N=1,038)	TIPS (N=732)	Student-to-Student Counseling (N=872)	All Four Innovations Combined (N=3,346)
III. Natural Sciences (cont.)					
8. Geology, mineralogy, and oceanography	5	18	14	0	37
9. Mathematics	44	70	64	19	197
10. Natural resources and water resources	2	2	1	0	5
11. Physics, biophysics, and nuclear physics	33	72 3rd	45	4	154
12. Physiology	3	4	4	0	11
13. Statistics and biostatistics	10	2	4	0	16
IV. Engineering	(66)	(139)	(47)	(14)	(266)
1. Aerospace	0	5	0	0	5
2. Agricultural	0	2	0	0	2
3. Applied mechanics and engineering science	3	8	1	1	13
4. Biological	0	1	1	0	2
5. Chemical	7	14	1	1	23
6. Civil	5	14	3	2	24
7. Computer and communication sciences	28	15	16	1	60
8. Electrical and computer; computer, information and control engineering	7	20	10	4	41
9. Industrial and operations	5	14	6	1	26

Discipline	Number of Responding Requests				
	EXPER SIM (N=704)	Guided Design (N=1,038)	TIPS (N=732)	Student-to-Student Counseling (N=872)	All Four Innovations Combined (N=3,346)[a]
IV. Engineering (cont.)					
10. Materials and Metallurgical	1	3	0	0	4
11. Mechanical	9	39	8	4	60
12. Naval architecture and marine	0	1	0	0	1
13. Nuclear	1	3	1	0	5
V. Agriculture	(2)	(1)	(2)	(1)	(6)
VI. Professional	(173)	(294)	(177)	(545)	(1,1879)
1. Architecture	1	3	0	0	4
2. Business administration (accounting, transportation, etc.)	26	36	25	24	111
3. Dentistry	0	1	0	0	1
4. Education (counseling and guidance, administration, elementary, secondary, higher education, curriculum, etc.)	129$^{\underline{\text{2nd}}}$	200$^{\underline{\text{1st}}}$	133$^{\underline{\text{1st}}}$	486$^{\underline{\text{1st}}}$	948$^{\underline{\text{1st}}}$
5. Home economics	2	6	2	1	11
6. Journalism	1	1	1	4	7
7. Law	1	4	3	2	10
8. Library science	1	7	2	1	11

Discipline	Number of Responding Requests				
	EXPER SIM (N=704)	Guided Design (N=1,038)	TIPS (N=732)	Student-to-Student Counseling (N=872)	All Four Innovations Combined (N=3,346)
VI. Professional (cont.)					
9. Medicine (obstetrics, gynecology, opthamology, pharmacology, pharmacy, surgery, etc.)	5	11	2	2	20
10. Music	1	3	2	6	12
11. Nursing and nutritional science	1	4	1	0	6
12. Public health (public health administration, population planning)	1	3	2	1	7
13. Social work	0	2	0	5	7
14. Theology	0	8	2	11	21
15. Veterinary medicine	1	2	0	0	3
16. Vocational school	1	3	2	2	8
Totals	704	1,038	732	872	3,346*

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*Of the 3,698 responding requests, 352 (10 per cent) did not indicate their discipline.

Table 5-28. Disciplines Most Frequently Requesting Each of the Four IMPACT Innovations.

Rank-Order	Disciplines and Frequency in Requesting the IMPACT Innovations									
	EXPER SIM (N=704)		Guided Design (N=1,038)		TIPS (N= 732)		Student-to-Student Counseling (N=872)		All Four Innovations Combined (N=3,344)*	
	Discipline	Percentage	Discipline	Percentage	Discipline	Percentage	Discipline	Percentage	Discipline	Percentage
First	Psychology	21%	Education	19%	Education	18%	Education	56%	Education	28%
Second	Education	18%	Chemistry	9%	Chemistry	12%	Psychology	14%	Psychology	12%
Third	Chemistry	8%	Physics	7%	Economics	9%	English	3%	Chemistry	7%
All other disciplines	—	53%	—	65%	—	61%	—	27%	—	53%
Totals		100%		100%		100%		100%		100%

* Of the 3,698 responding requests, 354 (10 per cent) did not indicate their discipline.

In any event, there seems to exist some relationship between the discipline of the four inventors and the requestors' disciplines for each of the four IMPACT innovations.

If an individual is a member of the same discipline as the inventor, is he/she more likely to pass further (1) through the stages in the innovation-decision process, and (2) through the stages of participation in the IMPACT Program? Table 5-29 shows that between one-third and two-thirds of the adopters of EXPER SIM, Guided Design, and Student-to-Student Counseling are homophilous with the inventor, in terms of their disciplines; whereas only ten per cent of the TIPS adopters were economists. For EXPER SIM and Guided Design those who are homophilous are more likely to be adopters than non-adopters. The 208 spontaneous adopters are most homophilous with the inventor with respect to their disciplines, and are thus farthest along in the stage of participation in the IMPACT program.

Academic and Administrative Rank

In our considerations about the relationship of academic rank to innovativeness of professors and counselors, we were impressed with an observation by Evans (1968, p. 156), made on the basis of his study of the adoption of the innovation of instructional television by university professors.

> An individual's position in the university-system, for example, his academic rank, which is usually closely related to his job security--bears some relationship to his receptivity to innovation. This, in fact, may represent one of the major keys to understanding the rejection of certain kinds of innovations in the university community. The young faculty member,

Table 5-29. Disciplinary Homophily for Inventors-Requestors by Stage in the Innovation-Decision Process, and by Stage of Participation in the IMPACT Program, by Innovation.

	Percentage of Responding Requests in the Inventor's Discipline				
	EXPER SIM (Psychology) (N=145)	Guided Design (Engineering) (N=139)	TIPS (Economics) (N=65)	Student-to Student Counseling (Education) (N=486)	All Four Innovations Combined (four disciplines) (N=835)
I. Stage in the Innovation-Decision Process*					
1. Non-adopter	17%	12%	9%	55%	20%
2. Intend to adopt	44%	19%	10%	57%	35%
3. Adopter	42%	33%	10%	62%	43%
All Individuals	19%	12%	8%	47%	26%
II. Stage of Participation in the IMPACT Program**					
1. Responding request only	18%	12%	9%	54%	20%
2. Grant applicant	27%	14%	16%	62%	32%
3. Spontaneous adopter	49%	38%	0%	63%	46%
All Individuals	19%	12%	8%	47%	26%

*Of the 3,698 responding requests, 499 (13 per cent) did not indicate their stage in the innovation-decision process.

**Of the 3,698 responding requests, 416 (10 per cent) did not indicate their stage of participation in the IMPACT program.

> who is not yet completely integrated into the system, may be more willing to experiment with newer methods, but becomes discouraged when he learns that the system appears to reward conforming rather than innovating behavior. He soon perceives that his future depends on "playing the game," at least until he has a secure "foothold" in the system. On the other hand, the senior faculty member with a secure footing may be less willing to abandon traditional methods in favor of new ones. His behavior has been "shaped" to conform to the system, and his innovative predispositions may have been extinguished.

This observation implies that lower-ranked faculty might be expected to be more likely to request, and perhaps to adopt, the four IMPACT innovations, but that such behavior would also be affected by their perceptions of the university reward system for teaching (an issue to which we return in the following section).

Unfortunately, we do not have a point of comparison for our data on the academic/administrative rank of the responding requests (shown in Table 5-30) that would allow us to determine whether or not, for example, assistant professors are under- or over- represented in our responding requests, because we do not know exactly how many assistant professors, associate professors, etc. there are in U.S. colleges and universities. So the data in Table 5-30 can only be weighed in light of a comparison of one rank with another as represented among our total number of responding requests, and across the four innovations.

Assistant professors and associate professors each constitute about 15 per cent of the responding requests (Table 5-30), but full professors make up only 8 per cent. Perhaps Evans (1968), quoted previously, is

Table 5-30. Academic and Administrative Rank for Responding Requests of the Four IMPACT Innovations, by Innovation.

Academic/ Administrative Rank	Percentage of Responding Requests				
	EXPER SIM (N=684)	Guided Design (N=1,024)	TIPS (N=710)	Student-to-Student Counseling (N=979)	All Four IMPACT Innovations (N=3,397)*
1. Administrator (vice-president, dean, president, etc.)	21%	22%	22%	45%	28%
2. Director of counseling and/or guidance center	1%	1%	1%	13%	4%
3. Department chairman	17%	20%	19%	4%	15%
4. Professor	8%	10%	10%	3%	8%
5. Associate professor	19%	19%	20%	6%	15%
6. Assistant professor (or lecturer)	22%	17%	18%	7%	15%
7. Instructor	5%	6%	4%	2%	5%
8. Professional staff (counselor, grant coordinator, etc.)	6%	4%	5%	18%	9%
9. Other titles	1%	1%	1%	2%	1%
Totals	100%	100%	100%	100%	100%

*Of the 3,698 responding requests in Phase I, 301 (8 per cent) did not answer the question about their academic rank.

correct about the greater innovativeness of lower-ranked teaching faculty (later we show this relationship is influenced by perceptions of the university reward system).

However, the most striking impression one gains from the data in Table 5-30 is the large number of administrators among the 3,698 responding requests.

Innovation	Percentage of Responding Requests Who Are Teaching (instructors, assistant professors, associate professors, and professors)	Percentage of Responding Requests Who Are Administrators (vice-presidents, deans, department chairmen, directors of counseling, etc.)	Total
1. [illegible]	54%	46%	100%
2. Guided Design	53%	47%	100%
3. [illegible]	[illegible]	[illegible]	100%
4. Student-to-Student Counseling	19%	81%	100%
All Four Innovations	43%	57%	100%

Administrators constitute 57 per cent of all the responding requests, slightly less than half for the three teaching innovations and 81 per cent for Student-to-Student Counseling (where directors of counseling centers make up 13 per cent of the responding requests). One possible reason for the large share of requests who are administrators is because many of the [illegible] brochures were mailed by the Exxon Education Foundation to college and university administrators. Also, our tabulation of requests ignores the fact that some, and in fact, perhaps many administrators (especially department chairmen) engage in at least some teaching/counseling activities.

Are teaching faculty more or less likely to adopt one of the IMPACT innovations than are administrators?

Stage in the Innovation-Decision Process	Teaching Faculty (instructors, etc.)	Administrators, (dept. chairman, director of counseling, etc.)	All Responding Requests
1. Non-adopter	87%	86%	86%
2. Intend to adopt	5%	7%	5%
3. Adopter	8%	7%	9%
Totals	100%	100%	100%

There is no difference between teaching faculty and administrators in their tendency to adopt, and this conclusion is consistent across the four IMPACT innovations.

Student Enrollment

Here, we consider the variable of size of the institution, measured in terms of the student enrollment at the respondent's university, as reported in the Education Directory, 1973-1974 (U.S. Office of Education, 1974).

There is a popular notion in academe that smaller-sized colleges and universities place greater emphasis upon effective undergraduate teaching, while larger universities emphasize research and scholarly publication over undergraduate teaching. If this is true, the "publish-or-perish" norms of larger universities ought to be reflected in a reward system that would be relatively less encouraging of innovation in undergraduate teaching and counseling.

Unfortunately, we do not have a random sample of all university faculty and staff in the U.S. for purposes of comparison with our responding requestors, adopters, etc. Nevertheless, we are able to compare our Phase I respondents who are "requests only" with those who are adopters or who intend to adopt, as to the size of their institution (measured in student enrollment).

Table 5-31 shows that:

1. Responding requests who are non-adopters are at smaller enrollment universities than are adopters for each of the four IMPACT innovations.* The requestor-adopter difference in student enrollment is wider in the case of EXPER SIM and especially TIPS, the two computer-related innovations, for which funds and computer facilities may be more likely to be available to adopters at larger universities. TIPS is particularly useful in large lecture classes, which are more likely to be found at larger universities.

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*One possible reason for this relationship may be due to the concentration of "later pre-IMPACT knowers" (who first learned of the IMPACT innovation between January and October, 1973) at smaller enrollment institutions; only 4 per cent of these respondents, we found, are adopters, while 30 per cent of the "early pre-IMPACT knowers" and 7 per cent of the "post-IMPACT knowers" (after November, 1973), are adopters, respectively.

Table 5-31. Student Enrollment, by Stage in the Innovation-Decision Process, and by Stage of Participation in the IMPACT Program, by Innovation.

	Average Student Enrollment at the University				
	EXPER SIM	Guided Design	TIPS	Student-to-Student Counseling	All Four Innovations Combined
I. Stage in the Innovation-Decision Process*					
1. Do not intend to adopt (so requested information only)	9,151 (N=632)	7,952 (N=913)	8,246 (N=722)	5,922 (N=736)	7,778 (N=3,003)
2. Intend to adopt during the 1974-75 academic year	10,935 (N=41)	7,117 (N=50)	13,362 (N=19)	5,399 (N=103)	7,578 (N=213)
3. Have adopted	11,004 (N=46)	9,833 (N=69)	15,817 (N=20)	7,558 (N=118)	9,919 (N=253)
II. Stage of Participation in the IMPACT Program**					
1. Responding requests only	9,224 (N=626)	7,915 (N=961)	8,306 (N=710)	6,007 (N=801)	7,758 (N=3,098)
2. Grant applicant	9,759 (N=70)	7,057 (N=55)	10,008 (N=51)	4,635 (N=80)	7,627 (N=256)
3. Spontaneous adopter	10,445 (N=33)	10,795 (N=55)	14,880 (N=10)	7,806 (N=110)	9,425 (N=208)
Totals	9,331 (N=729)	8,019 (N=1,071)	8,504 (N=771)	6,080 (N=991)	7,857 (N=3,562)

*Of the 3,698 responding requests in Phase I, 499 (13 per cent) did not indicate their adoption/intend to adopt/non-adoption, or student enrollment.

**Of the 3,698 responding requests in Phase I, 136 (4 per cent) did not indicate their stage of participation in the IMPACT program, or student enrollment.

2. *Spontaneous adopters tend to be at larger-enrollment universities than are grant-applicants and responding requests.* Resources may be more readily available at these larger universities, and so individuals there are less likely to need to apply for an IMPACT grant, as alternative funding is available. The "request only"/spontaneous adopter difference in student enrollment is especially marked in the case of TIPS. For Guided Design and Student-to-Student Counseling, average student enrollment is less for grant applicants than for responding requests.

Perceptions of the Reward System for Teaching

This section is concerned with the respondents' perception of the rewards given to effective teaching in his/her institution's decisions about faculty promotion and salary increase. We measured this aspect of the perceived reward system with the following question* in the Phase I questionnaire:

> What relative weight is given to effective teaching, versus research and publication, when a faculty member in your unit (such as a department) is considered for a promotion or a raise? PLEASE DISTRIBUTE 100 POINTS BETWEEN THESE TWO ALTERNATIVES, DISREGARDING COMMUNITY SERVICE AND OTHER RESPONSIBILITIES:
>
> ______________% Teaching
>
> ______________% Research and publication

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* This question is adapted from an instrument designed by Dr. Robert Kozma, Center for Research on Learning and Teaching, University of Michigan.

This question was somewhat sensitive for our Phase I respondents, as only 2,958 of the 3,698 responding requests (80 per cent) answered it. Several respondents wrote comments on their questionnaire about this question, either qualifying their response, objecting to the question in general or the way in which it was worded* , or stating that they did not know what their department rewarded. Our main variable in the present section is the weighting given to teaching. The range possible is from zero to 100 per cent, but the average weighting for the 2,958 respondents to this question is 71 per cent, indicating that for all of our responding requests as a category, teaching is perceived as relatively more important in the reward system than is research-and-publications.

Previously, we quoted Evans (1968) on the importance of the university reward system as a possible barrier to teaching innovation. While much research has been conducted on perceived reward systems in industry and business, our reveiw of literature did not indicate any investigation of this topic in universities.

synthesis of social-psychological studies on rewards in industry concludes: "Organizations tend to motivate the kind of behavior they reward. Thus, one effective way to understand the behavior of individuals in organizations is to look generally at how rewards are given in the organization and specifically at what individuals have to do to obtain the rewards they values ([illegible] and others, 1975, p. 363; italics from the original).

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* A few respondents said that "service" should also have been included as a third category in the question.

So we expected to find that adopters of the IMPACT innovations would place a higher ranking on teaching in the perceived reward system of their institution. However, Table 5-32 shows that adopters and non-adopters do not differ much on perceptions of the importance of teaching in their institution's reward system. If anything, the adopters weigh teaching as slightly less important in their institution's reward system.

Nor is there much difference in Table 5-32 on the basis of stage of participation in the IMPACT program, although spontaneous adopters and requestors only put slightly greater weight on teaching than do grant applicants.

There are, however, some differences from innovation to innovation with Student-to-Student Counseling requests giving teaching an average weight of 70 per cent, while the requests for the three teaching innovations average from 67 to 70 per cent (Table 5-32).

Table 5-33 presents the Pearsonian product-moment correlations of perceived teaching weight with the responding requests' individual and institutional characteristics. Generally, the perceived importance of teaching in the reward system is negatively related with (1) highest degree completed, (2) highest degree offered by the institution, (3) size of the institution, as measured by student enrollment, and (4) Gourman rating of the academic quality of the institution. These consistent negative correlations indicate that teaching is perceived to be more

Table 5-32. Perceived Importance of Teaching in the Reward System, by Stage in the Innovation-Decision Process, and by Stage of Participation in the IMPACT Program, by Innovation.

	Perceived Importance of Teaching in the Reward System				
	EXPER SIM (N=595)	Guided Design (N=851)	TIPS (N=633)	Student-to-Student Counseling (N=879)	All Four Innovations Combined (N=2,958)*
I. Stage in the Innovation-Decision Process					
1. Non-adopter	67	70	68	78	71
2. Intend to adopt	57	72	53	82	72
3. Adopter	62	66	48	80	71
Totals	67	70	67	79	71
II. Stage of Participation in the IMPACT Program					
1. Responding request only	67	71	68	78	72
2. Grant applicant	62	65	59	81	69
3. Spontaneous adopter	61	65	59	81	72
Totals	67	70	67	79	71

*Of the 3,698 responding requests, 740 (20 per cent) did not answer the question about the perceived importance of teaching in the reward system.

Table 5-33. Correlations of the Perceived Importance of Teaching in the Reward System with Selected Personal and Institutional Characteristics of the Responding Requests, by Innovation.*

Personal and Institutional Characteristics of the Responding Requests	Correlation with Perceived Importance of Teaching in the Reward System			
	EXPER SIM (N=595)	Guided Design (N=851)	TIPS (N=633)	Student-to-Student Counseling (N=879)
1. Highest degree completed	-.18	-.22	-.22	-.18
2. Highest degree offered at the institution	-.56	-.49	-.50	-.53
3. Student enrollment at the institution	-.51	-.53	-.53	-.45
4. Gourman rating of the academic quality of the institution	-.60	-.64	-.64	-.58
Multiple correlation	.68	.64	.65	.65
Coefficient of multiple determination	45%	41%	42%	42%

*Of the 3,698 responding requests, 740 (20 per cent) did not answer the question about the perceived importance of teaching in the reward system, and hence could not be included in the analysis reported in this table.

Table 5-32. Perceived Importance of Teaching in the Reward System, by Stage in the Innovation-Decision Process, and by Stage of Participation in the IMPACT Program, by Innovation.

	Perceived Importance of Teaching in the Reward System				
	EXPER SIM (N=595)	Guided Design (N=851)	TIPS (N=633)	Student-to-Student Counseling (N=879)	All Four Innovations Combined (N=2,958)*
I. Stage in the Innovation-Decision Process					
1. Non-adopter	67	70	68	78	71
2. Intend to adopt	57	72	53	82	72
3. Adopter	62	66	48	80	71
Totals	67	70	67	79	71
II. Stage of Participation in the IMPACT Program					
1. Responding request only	67	71	68	78	72
2. Grant applicant	62	65	59	81	69
3. Spontaneous adopter	61	65	59	81	72
Totals	67	70	67	79	71

*Of the 3,698 responding requests, 740 (20 per cent) did not answer the question about the perceived importance of teaching in the reward system.

Table 5-33. Correlations of the Perceived Importance of Teaching in the Reward System with Selected Personal and Institutional Characteristics of the Responding Requests, by Innovation.*

Personal and Institutional Characteristics of the Responding Requests	Correlation with Perceived Importance of Teaching in the Reward System			
	EXPER SIM (N=595)	Guided Design (N=851)	TIPS (N=633)	Student-to-Student Counseling (N=879)
1. Highest degree completed	-.18	-.22	-.22	-.18
2. Highest degree offered at the institution	-.56	-.49	-.50	-.53
3. Student enrollment at the institution	-.51	-.53	-.53	-.45
4. Gourman rating of the academic quality of the institution	-.60	-.64	-.64	-.58
Multiple correlation	.68	.64	.65	.65
Coefficient of multiple determination	46%	41%	42%	42%

*Of the 3,698 responding requests, 740 (20 per cent) did not answer the question about the perceived importance of teaching in the reward system, and hence could not be included in the analysis reported in this table.

important in the reward system by individuals (1) who do not possess a doctorate degree, (2) who are employed at institutions that do not offer the doctorate degree, (3) whose institutions have a smaller student enrollment, and (4) who are employed at institutions with lower academic quality, as measured by the Gourman rating. Somewhat less than half of the variance in the variable of the perceived importance of teaching is explained by these four independent variables (Table 5-33).

Table 5-34 illustrates the strong negative relationship between university size (as measured in total student enrollment) and the perceived importance of teaching in the reward system. Smaller-sized institutions are perceived as placing much greater importance on teaching, rather than research and publications.

Gourman Ranking of University Academic Quality

The college or university affiliation of each of the responding requestors in our Phase I were coded as to their Gourman (1967) ranking on academic quality, as explained previously in this chapter. Of the 3,698 responding requests, 1,169 (32 per cent) could not be given a Gourman rank as to academic quality because their institution was not ranked in the Gourman (1967) report (for example, rankings are not available for community colleges or junior colleges). The average Gourman ranking for these 2,529 requests is 377; the possible range of scores is from about 200 to 700, with a higher score indicating higher academic quality of the institution.

Table 5-34. Perceived Importance of Teaching in the Reward System, by Size of Institution (as measured by student enrollment), by Innovation.

	Perceived Importance of Teaching in the Reward System				
Student Enrollment	EXPER SIM (N= 583)	Guided Design (N= 825)	TIPS (N= 615)	Student-to-Student Counseling (N= 853)	All Four Innovations Combined (N= 2,876)*
1. Small (5,000 students or less	80	82	81	87	83
2. Medium (5,001 to 9,999 students	66	67	64	72	67
3. Large (10,000 students or more.)	49	48	47	61	51

* Of the 3,698 responding requests, 822 (22 per cent) did not answer the question about the perceived importance of teaching, or else the question on student enrollment.

Previously, we showed that Gourman scores are negatively correlated with the importance of teaching in the reward system (Table 5-23). We also found that higher Gourman rankings are associated with larger-enrollment universities, which we previously found were associated (1) with spontaneous adoption of the four IMPACT innovations, and (2) with adoption rather than only requesting the IMPACT innovations. The interrelationships among these four variables may thus be diagrammed as follows.

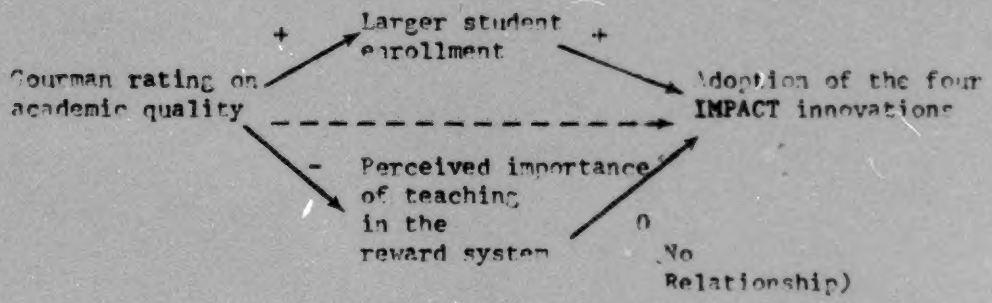
Gourman rating on academic quality
+
Larger student enrollment
+
Adoption of the four IMPACT innovations
-
Perceived importance of teaching in the reward system
0
(No Relationship)

Table 5-35 shows that the Gourman scores on academic quality are higher for adopters than for non-adopters of the three IMPACT teaching innovations, but the reverse is true for Student-to-Student Counseling. Also, the latter innovation is adopted at institutions with lower Gourman scores ($\bar{X}$ = 342) than the three teaching innovations, which are adopted at institutions with average Gourman scores ranging from 396 to 492.

Table 5-35 further shows that the Gourman scores on academic quality are highest for spontaneous adopters, followed by grant applicants and responding requests, for the three IMPACT teaching innovations, but the reverse is true for Student-to-Student Counseling.

Table 5-35. Gourman Rankings on Academic Quality, by Stage in the Innovation-Decision Process, and by Stage of Participation in the IMPACT Program, by Innovation.

	Average Gourman Rankings on Academic Quality of the Institution				
	EXPER SIM (N=558)	Guided Design (N=772)	TIPS (N=549)	Student-to-Student Counseling (N=650)	All Four Innovations Combined (N=2,529)*
I. Stage in the Innovation-Decision Process					
1. Non-adopters	396	376	379	354	376
2. Intend to adopt	431	369	427	370	381
3. Adopter	428	396	492	342	385
Totals	400	378	383	352	377
II. Stage of Participation in the IMPACT Program					
1. Responding request only	398	376	379	355	376
2. Grant applicant	412	392	411	337	387
3. Spontaneous adopter	418	401	513	340	378
Totals	400	378	383	352	377

*Of the 3,698 responding requests, 1,169 (32 per cent) did not have data available on their Gourman ranking.

Other Personal Characteristics

We investigated five other variables, each tapping different personal characteristics of the respondents, as they were related (1) to stage in the innovation-decision process, and (2) to the stage of participation in the IMPACT program.

(1) Age was not consistently different (1) among non-adopters/intended adopters/adopters, nor (2) among "requestors only"/grant applicants/spontaneous adopters.

(2) Neither was the number of years the respondent had been at his/her present institution.

(3) Enrollment in the largest class taught (in the past year) was higher for adopters (average enrollment is 54) than for intended adopters ($\bar{X} = 41$) and non-adopters ($\bar{X} = 48$), especially for TIPS (where adopters average 240 student enrollments, and non-adopters 71), but the reverse was true in the case of Student-to-Student Counseling, where adopters had smaller-sized classes than non-adopters. Spontaneous adopters had larger enrollments than "requestors only" for the three teaching innovations, but the reverse was the case for Student-to-Student Counseling.

(4) Secondary diffusion activity, as measured by the number of secondary receivers each respondent talked to, was greatest for spontaneous adopters ($\bar{X} = 2.00$), less for grant applicants ($\bar{X} = 1.56$), and least for "requestors only" ($\bar{X} = 0.76$). Similar differences were found on the basis

of participation in the IMPACT program: adopters had the greatest secondary diffusion activity ($\bar{X}$ = 1.22), followed by intended adopters ($\bar{X}$ = 0.96), and by non-adopters ($\bar{X}$ = 0.50) (Table 5-5).

(5) General innovativeness, as indexed by the number of seven teaching innovations (such as contract grading, small-group discussion, videotapes, etc.) used, was higher for spontaneous adopters ($\bar{X}$ = 3.4) than for grant applicants ($\bar{X}$ = 3.2) or "requestors only" ($\bar{X}$ = 3.1).

Grantee Versus Non-Grantee Applicants

Throughout the previous sections, we have considered "grant applicants" as a single category of 266 individuals.* In the present section, we consider two sub-categories of grant applicants:

(1) The 55 successful applicants who were awarded grants by the Exxon Education Foundation.

(2) The 211 non-grantee applicants.

The grantees, when compared with non-grantee applicants, are:

(1) Somewhat less likely to be multiple requestors (14 per cent versus 21 per cent).

(2) More likely to be teaching faculty, than administrators (60 per cent versus 53 per cent).

(3) Affiliated with larger-sized institutions (9,316 average student enrollment versus 7,175).

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* This number is smaller than the number shown in Table 3-3, which includes applicants from later grant competitions in 1975, after our Phase I data were gathered.

(4) Characterized by less importance on teaching in the perceived reward system (an average weight on teaching of 64 versus 70 for non-grantee applicants).

(5) Employed at universities with higher Gourman rankings on academic quality (401 versus 383).

(6) Slightly younger (37 years versus 39).

(7) Teaching larger-sized classes (101 versus 54 students), although much of this difference is due to the TIPS applicants.

(8) More actively diffusing the innovation to secondary receivers (2.93 secondary receivers for grantees versus 1.21 for non-grantee applicants).

We conclude generally that *the grantees are fairly distinctive from the non-grantee applicants, with the grantees' personal and institutional characteristics more similar to the spontaneous adopters, and the non-grantee applicants differing in the direction of the "requests only"*.

Motivations for Requesting Information

In this final section of evidence bearing on research question #5, we analyze motivations for requesting information about the IMPACT innovations by stage of participation in the IMPACT program. Table 5-36 uses the four categories of motivations for requesting information that we presented previously in Table 5-12. The main difference in reasons for

Table 5-36. Reasons for Requesting Information about the IMPACT Innovations, by Stage of Participation in the IMPACT Program.

Reasons for Requesting Information about the IMPACT Innovations	Request Only (N=3,501)	Grant Applicant (N=309)	Spontaneous Adopters (N=223)	All Requests (N=4,033)
1. Potential utility in teaching/counseling	55%	57%	61%	56%
2. Informational search	29%	18%	25%	28%
3. To make a grant proposal	9%	22%	9%	10%
4. Other reasons	7%	3%	5%	6%
	100%	100%	100%	100%

requesting for "requests only"/grant applicants/spontaneous adopters is that the grant applicants were more likely to report they requested information in order to make a grant proposal, as might be expected.

RESEARCH QUESTION #6: CONSEQUENCES OF THE INNOVATIONS

Our research question #6 is: What are the consequences and effects of the four innovations after their adoption by grantees and by spontaneous adopters?

The four inventors have gathered fairly detailed evaluative data about the effectiveness of their innovation. Dana Main, Charles C. Wales, Allen C. Kelley, and William F. Brown have published in various professional journals about their experiences with the use of their innovation, as have sub-inventors Arthur Cromer and Bassam Shakhashiri. The main findings from these evaluations of the IMPACT innovations are reviewed later in this section, following our presentation of the more qualitative data about consequences, gained mainly from our Phase II interviews with adopters.

Consequences are changes that occur within a social system as a result of the adoption or rejection of an innovation.

Data from Interviews with Adopters

One measure of whether the consequences of the four IMPACT innovations were perceived as favorable or not is the number of discontinuances* that occurred. We only encountered two discontinuances among the 263 adopters of the innovations:

1. One professor was dissatisfied with the results of Guided Design, and so adopted EXPER SIM as an alternative teaching approach. Dr. "K" attended a workshop conducted by Professor Wales in early 1973, where he

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*A discontinuance is a decision to cease using an innovation after previously adopting it.

learned about Guided Design, and adopted it in his freshman engineering courses in Fall, 1973. After a year's experience with the innovation, Dr. K concluded that it was not compatible with his philosophy of teaching, and so he dropped it and decided to adopt EXPER SIM in 1975.

2. A second professor, Dr. "C", was a satisfied adopter of Guided Design from 1970 to 1974. However, in 1974 she was appointed Assistant Dean of her college and thereafter found that she had inadequate time available to prepare the Guided Design materials for her course. So she was forced to discontinue use of the innovation.

Of the 263 adopters of the four IMPACT innovations, 261 (99 per cent) are satisfied users, who have not discontinued.* These individuals provided many types of personal experience about the favorable consequences of the innovations in our Phase II interviews. One important consequence of the IMPACT innovations is that they frequently change the role of teachers and counselors. The philosophy of teaching/counseling that the innovations promote have frequently changed the behavior of the adopters; for example, one adopter stated, "Guided Design requires the teacher to get out of the lecture-giving role and force oneself to truly guide students' learning." Many adopters perceived the use of an IMPACT innovation as an "organizing" influence on their teaching syle, providing them with a greater degree of preparedness in their classes. For example, one Phase II respondent said: "In literature, there is very little appreciation for precision. I found TIPS to be an excellent self-disciplinary experience. It has great potential for social change as it allows for a healthy heterogeneity and at the same time maintains legitimate differences both among students and teachers."

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*Although it must be kept in mind that many of the 261 "satisfied" adopters of the IMPACT innovations have only adopted for a year or two, and hence may have a somewhat limited opportunity for discontinuance.

EXPER SIM adopters mentioned the following advantages of the innovation:

1. It provides students with an opportunity to be creative and independent.
2. EXPER SIM provides an appreciation for the use of computers.
3. It makes students aware of the time and cost involved in conducting research.
4. It extends the range of learning activities for students in a research design course.
5. EXPER SIM develops the ability to formulate research strategies.

Guided Design adopters mentioned the following advantages:

1. It develops self-assurance and self-expression on the part of students.
2. It reduces the transition in styles of thinking required in going from college to the first job.
3. Guided Design develops independent and orignal thinking.
4. It introduces students to a sequential method of thinking.
5. It develops sensitivity and appreciation for value systems.
6. It increases students' analytical skills.
7. Guided Design helps them actively seek solutions rather than be just a passive learner.

TIPS adopters gave these main advantages:

1. It helps diagnose problem-students early in the term.
2. TIPS allows teachers to better manage information and thus focus attention on the subject-content.
3. It forces students (as well as teachers) to be more familiar with the subject matter.

4. TIPS individualizes instruction in a large class.

5. It develops better study habits.

The adopters of Student-to-Student Counseling mentioned the following advantages:

1. It fosters a type of relationship between the student counselor and the counselee that professional counselors cannot have.
2. It fosters more empathetic counseling services.
3. It helps freshmen in the transition from high school to college life.
4. It helps reduce the student attrition rate, especially among freshman.
5. It gives student counselors a useful work experience and helps them prepare for a professional role.

Another type of data bearing on discontinuance is that already reviewed under research question #4 on modification, expansion, and re-invention. The fact that we found very little re-invention (almost none by our standards) is one indirect evidence of the generally favorable perceived consequences of the four IMPACT innovations.

While most of the data about consequences comes from the Phase II interviews with adopters, we also asked one question about the perceived consequences of TIPS to all the Phase I responding requests for TIPS.* First, our respondents were asked: "What students do you think need the most help from a college teacher?" About 24 per cent said students with top grades, 63 per cent said average students, and 13 per cent stated students with poor

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*We found that 608 requests provided such data.

grades. Supposedly, one advantage of TIPS is that it allows the teacher of a large-enrollment class to reach any particular segment of his students. So we asked: "Do you think that TIPS enables you to reach this group?" About 88 per cent said "Yes". So again we see the generally favorable perceptions of the innovation, although it must be cautioned that only part of these TIPS requests had actually adopted the innovation, and thus had personal experience on which to base their answer.

The four innovations' consequences are also perceived by students. They generally say that the use of the innovations leads to more enjoyable and effective learning and a better orientation to college life. Although we were not always able to interview students who were being taught/counseled with the IMPACT innovation, when we personally interviewed adopters in Phase II, we found very few students with complaints. Perhaps in the case of the three teaching innovations, the professor's enthusiasm for the innovation rubbed off on his/her students. Student reaction to the IMPACT innovations was often measured in evaluation studies (to be reviewed shortly). Generally, it was highly favorable.

Evaluation Studies of the Effectiveness of the Innovations

In addition to the effectiveness studies by inventors, some adopters have kept detailed data on the effectiveness of the IMPACT innovations. Of 120 adopters who were interviewed, about 15 per cent have collected such data, much of which has not yet been published. Many of the other 85 per cent are collecting data which are not yet analyzed. Some of the measures of innovation effectiveness that are being gathered are:

1. Student grade point changes.
2. Student motivation.

3. Student attitudes toward computers, to peer counselors, and to other aspects of the IMPACT innovations.
4. Student attrition rates (especially for peer counseling).
5. Decision-making ability in the face of many issues (especially for Guided Design).
6. The ability to design research and to interpret data (especially for EXPER SIM).
7. Student ability to develop an organized and efficient way of learning (for TIPS).
8. Student retention of subject matter.
9. Student choice of major as a result of the use of the innovation.
10. Cost per student taught or counseled.

A study dealing with computer-assisted learning projects at various universities indicates that: "The computer's unique ability to provide low-cost enrichment represents the most under-exploited aspect of educational technology. It follows that the real impact of the new technology will be for the most part adding to, rather than replacing, current learning mechanisms" (Rockart and Morton, 1975). This comment applies directly to the two computer-dependent IMPACT innovations of EXPER SIM and TIPS, and also to Guided Design and Student-to-Student Counseling in the sense that they also represent increments rather than substitutions for "traditional" course (or counseling) procedures. So an appropriate research design for evaluation research on the innovations' effectiveness basically involves a comparison of the use of the innovation with the traditional procedure. These are usually some type of field experiment.

__Evaluation__ is a type of research that is conducted to determine the effects of programs or projects, under operation conditions, in order to provide a scientific basis for decision (Rogers and Agarwala-Rogers, 1975). Field experimental designs are frequently utilized to evaluate the consequences of the IMPACT innovations*.

A __field experiment__ is an active intervention by an experimenter who administers a treatment to randomly-selected respondents arranged in groups that are equivalent in the way they were chosen with at least one treatment and one control group (that does not receive any treatment) (Rogers and Agarwala-Rogers, 1975). Strangely, the adopters of EXPER SIM (who use the innovation to teach research and experimental methods) have been less interested in conducting field experiments on the innovation's consequences.

Main and Nussloch (1975) compared the effectiveness of two pedagogical strategies in teaching introductory experimental psychology. The strategies are (1) to have students read, analyze, and critique journal articles, and (2) to have students design and run mock experiments with computer data generated to test hypotheses (this is the basic EXPER SIM approach). The second approach was found to be more effective as a method of teaching. Cromer and Thurmond (Undated) have substantiated these findings.

Charles Wales has made several attempts to evaluate Guided Design in comparison with the usual lecture-based approach to teaching large classes. Wales found that the Guided Design approach generally is superior in teaching knowledge, sensitivity to value systems, and decision-making ability, whereas the traditional method of teaching focuses mainly on the "passing on" of knowledge. Evaluation studies by Wales and his colleagues (1975) report an increase in the overall grade-point of engineering students taught with the Guided Design approach.

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*Evaluation studies of the IMPACT innovations are beginning to be reported: By June, 1975, we had received seven studies by spontaneous adopters, in addition to the studies done by the inventors/sub-inventors.

Findings from various evaluation studies conducted at West Virginia University, Wayne State University, Youngstown State University, Wichita State University, and the University of Michigan, on the various facets of the effectiveness of Guided Design show that:

1. It increases students' tolerance for ambiguity.
2. It increases students' need for achievement.
3. It lowers students' anxiety.
4. It improves students' performance in professional schools.
5. It makes them more effective in communication skills.
6. It helps systematic development of such intellectual activities as knowledge, comprehension, application, analysis, synthesis, and evaluation.

Perhaps TIPS, more than any other innovation, has been studied with a greater scientific rigor. A controlled study involving about 1,000 students in economics classes indicated that the use of TIPS: (1) increased student achievement, (2) increased relatively poorer students' achievement more than it increased the performance of better students, (3) led to improvement in student performance independently of the type of examination questions used, and (4) was not limited by student hostility toward computers. The choice of major two years after the course shows that a number of the students chose economics. Some data on the cost effectiveness of TIPS was also provided by Kelley's (1968, 1972) studies.

Dr. Bassam Shakhashiri of the University of Wisconsin-Madison reported that TIPS is a more effective method of teaching chemistry and that students like it. In one field experiment, the same professor taught two classes, one using ChemTIPS and the other without it. ChemTIPS had greater effectiveness.

Dr. William Brown (1972) and his associates have conducted more than 30 investigations of the effectiveness of Student-to-Student Counseling involving approximately 42,500 students enrolled at 60 high schools and colleges. These evaluation studies show that the students counseled by other students receive higher academic grades and are less likely to drop out of college than students not counseled by student counselors. In comparison to professional counseling, Student-to-Student Counseling is generally much more cost-effective.

Not all of the field experiments on the effectiveness of the four IMPACT innovations represent ideal research designs (for example, some do not include a control group or with some other comparison in order to provide a basis for measuring relative effectiveness of the innovation), and precise data on cost-effectiveness are not always gathered. Nevertheless, we feel the overall results of these field experiments are generally convincing.

We conclude that the consequences of the four IMPACT innovations (1) are generally perceived by adopters and students as favorable, and (2) are evaluated as advantageous when compared to traditional approaches to teaching/counseling in field experiments.

RESEARCH QUESTION #7: PERCEIVED ATTRIBUTES OF THE INNOVATIONS

Our research question #7 is: *How are the four innovations perceived by faculty members, students, and administrators, and how do these perceived attributes of the innovations (such as their relative advantage over existing practice, complexity, etc.) affect their rate of adoption?*

Perceived attributes of an innovation are important in determining the rate of adoption of the innovation (Chapter 2). The main perceived attributes of innovations which influence the rate of adoption are as follows:

1. *Relative advantage*: is the degree to which an innovation is perceived to be superior to the existing practice that it supercedes. For instance, economic profitability (or savings), social gains, etc., are commonly perceived relative advantages, past diffusion research indicates. Economic profitability is usually measured in terms of such subdimensions as low initial cost, increased effectiveness and efficiency, time and effort savings, etc. Still another dimension is that the adoption of an innovation provides services that did not exist prior to adoption.

The 120 adopters that we interviewed in Phase II mentioned such relative advantage factors as increased effectiveness in their teaching/counseling (89 per cent), increased efficiency as a teacher/counselor (70 per cent), and heightened ability in managing large-sized introductory classes and/or counseling units (60 per cent). As one adopter said about one of the innovations: "The market for TIPS is large universities where there are lots of students and large classes with inadequate facilities and personnel."

Excessive time required at the initial stages of use was perceived as the most important negative aspect of the four innovations' relative advantage. We asked all of the interviewed adopters how they perceived the amount of time necessary for adoption.

1. Takes a lot more time ------------------------87%
2. Gradually will take less time----------------- 8%
3. Does not take more time---------------------- 5%

Total--------------------------100%

The issue of initial cost was perceived by adopters as less important. Out of 120 adopters, 55 (46 per cent) had grants from the Exxon Education Foundation. The other 65 adopters obtained funds from various other sources (Hogg Foundation, National Science Foundation, Hill Family Foundation, departmental "slush funds", college counseling center funds, etc.). Of 65 spontaneous adopters, 41 per cent said that the use of the IMPACT innovation did require more money than their previous method of teaching the same course. But more than half (59 per cent) said that funds were available to them, and also faculty release time. Much of these funds came from such administrators as the department chairman, dean, vice-presidents, etc. Hence, slack resources* from within the university and financial grants from external sources are the two most frequent sources of funds for the adoption of the four IMPACT innovations.

The ability of the IMPACT innovations to bridge a *performance gap* (or gaps)** was also perceived as an important part of relative advantage. Sometimes this performance gap was evidenced by a rapidly-increased enrollment in a particular class, a sudden budget cut (leading to a desire for greater efficiency), or a problem with recruiting or retaining a particular kind of staff member.*** In many cases, we conclude from the interviews with adopters that the awareness of the innovation helped *create* a perceived performance gaps. For example, when one of our respondents first learned about EXPER SIM, he could immediately see its potential for use in his experimental psychology course, and promptly installed it as a lower-cost replacement for the rat laboratory that his department had previously maintained.

The gap between school and the job market is one not easily bridged by traditional teaching methods and students have often complained about this deficiency in universities. Several adopters of Guided Design noted that this open-ended problem-solving approach has facilitated or would facilitate the transition from "the warm womb of the university into the cold, cruel world".

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* *Slack resources* are resources which are not already committed to other purposes (Rogers and Agarwala-Rogers, Forthcoming).

** A *performance gap* is the condition of a system in which a difference exists between the actual condition of a system property, and the anticipation of what that condition would be in order to meet a system problem more effectively.

***Such performance gaps can serve as *cues-to-action*, events in time that crystallize attitudes into action.

TIPS adopters agree that early detection of student learning deficiencies in a course is essential, and that TIPS is a most effective way of providing this service to students. So the most important perception of TIPS' relative advantage is of its diagnostic and feedback function.

As might be expected, the need to reduce high attrition rates at many colleges and universities plays a major role in the adoption of Professor Brown's Student-to-Student Counseling. Although the majority of adopters' respective schools were operating some type of counseling program before Student-to-Student Counseling came along, most were inadequate to meet student needs, the adopters reported. Quite often, the inadequacy was due to a lack of enough professional personnel and well-trained counselors to deal with many of the students' problems, usually as a result of low budgets. The innovation offered a means of expanding and/or improving an existing counseling program. As one adopter asserted: "We augment our counseling program with trained and selected peer counselors".

The seeming ability of the IMPACT innovations to bridge perceived gaps through improved effectiveness and efficiency is an important reason for adoption. Thus, the perceived relative advantage of the four IMPACT innovations are positively related to their rate of adoption.

2. Compatibility: is the degree to which an innovation is perceived as consistent with the existing values, felt needs, and past experience of individuals. Computer compatability between the inventor's and the adopter's facilities was an important subdimension of the attribute of compatability for EXPER SIM and TIPS (see our previous discussion on this point under research question #3).*

The four IMPACT innovations are perceived by the Phase II adopters as lessening the role of the teacher/counselor and competing for students' attention.

Adopters are concerned that especially in a large class, it is difficult to provide much individual attention to the students. For example, EXPER SIM, Guided Design, and TIPS all release the instructor from the traditional teaching role of lecturing and other one-way communication activities, and thus free them to give more individualized teaching to students. Many adopters favor the change from a conventional lecturing role to becoming a "guide and co-learner" with the students.

However, we found that some teachers' need to perform was threatened by the IMPACT teaching innovations (Carlson, 1965). Some adopters feared the excessive depersonalization of the learning situation caused by the computer-dependence of TIPS, for example: "I have to go to the computer print-out to find out about a student before I can tell them about themselves". This comment implies a sense of competition with the computer on the part of the professor. Our general impression is that *the college professors' need to perform as a lecturer is negatively related to the rate of adoption of the three teaching innovations*.

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* We found that 21 per cent of the adopters of the two computer-related innovations did not know computer programming, 9 per cent had not previously used computers either for teaching and/or research; and only 14 per cent had incompatible computers to that of the inventor or the sub-inventor.

More generally, we conclude that *an innovation's degree of compatability with existing values, felt needs, and past experiences is not strongly related to the innovation's rate of adoption*.

3. *Complexity*: is the degree to which an innovation is perceived as relatively difficult to adopt and requiring some special skills and facilities for adoption. Both EXPER SIM and TIPS cause some problems of computer-based complexity for our adopters, as we described previously, and this problem is especially serious for the several adopters who have not had prior computer experience. However, some 42 adopters of EXPER SIM and TIPS mentioned that the complex nature of the computer (and its use for EXPER SIM and TIPS) was one factor that lead them to adopt (in addition to the usefulness of the innovation in their instructional situation). Some adopters felt it was a challenge to them: for example, one adopter said: "To write my own computer program, and at the same time not get side-tracked from the main pedagogy of the innovation was

titillating----intellectually. It also provided me with an empty scaffold [the computer program for EXPER SIM] ready to be filled with meaningful information which teaches the concepts of psychology".

Other than the computer-related aspect of complexity (and that for only a few adopters), we did not find other dimensions of complexity. Most respondents that we interviewed in Phase II said they could grasp the basic idea of the IMPACT innovations rather easily. However, our interview data came mainly from adopters, so it is possible that complexity is a more important consideration for the requestors who did not adopt.

But generally, we conclude that complexity has not importantly affected the rate of adoption of the four IMPACT innovations.

4. Trialability: is the degree to which an innovation may be experimented with on a limited basis. We asked all the adopters who were interviewed in Phase II about the extent of utilization of their innovation in terms of the total class/counseling time devoted to its use, and the proportion of all the courses taught with the innovation for EXPER SIM, Guided Design, and TIPS. We found the innovations used mainly as a partial supplement to an already-existing teaching/counseling method. In only about 10 per cent of the adoptions did one of the IMPACT innovations completely replace the

existing mode of instruction or counseling. The total portion of class time devoted to the use of one of the three teaching innovations is:

Extent of Use of the Innovation	Percentage of Adopters
91-100 per cent of the class time	34%
71-90 per cent of the class time	19%
41-70 per cent of the class time	19%
40 per cent or less of the class time	28%
Total	100%

The IMPACT teaching innovations are supplements, not substitutes, for existing insturctional approaches. Another interpretation of these data is that most adopters use the IMPACT teaching innovations on a trial basis, at least at first (the real proof of this point, of course, would be to investigate the extent of use by an adopter over time, but we found it impossible to gather accurate data of this kind in our Phase II interviews).

Partial adoption of the IMPACT innovations is very common, suggesting that their trialability may be related to their rate of adoption.

5. *Observability:* is the degree to which the results of an innovation are visible to others. Two main aspects of observability are (1) the degree of physical visibility of an innovation, and (2) the degree to which data on the objectively-measured effectiveness of the innovation

are gathered and published.

The physical visibility of the innovations is increased by the IMPACT workshops conducted by the four inventors. At the workshops, the participants are provided with first-hand experience with use of the innovation. The inventors ingeniously used various communication strategies in order to increase the effectiveness of the workshops. For example, they invite adopters who are successful users of the innovation to discuss their experience at a workshop.

The evaluation studies (discussed under research question #6) are means to increase the innovation's observability. Considerable data are available about the relative effectiveness of the four IMPACT innovations, and many more field experiments are underway.

Although the evidence is relatively weak, it seems that observability is positively related to the rate of adoption of the four IMPACT innovations.

RESEARCH QUESTION #8: DIFFUSION STRATEGIES

Our research question #8 is: What diffusion strategies (for example, financial incentives for adoption, or a special message aimed at a particular audience) might be tested in field experiments to alter the rate of diffusion of the four innovations?

In our Phase II interviews, as well as in our Phase I mailed questionnaire, we asked questions to obtain suggested strategies for a more rapid diffusion of the four IMPACT innovations. Here are seven diffusion strategies* that have been suggested by our respondents, as modified by the project staff:

1. Provide a list of adopters of EXPER SIM, Guided Design, TIPS, and Student-to-Student Counseling to all individuals who request information from the inventors, so that these adopters can be contacted by requestors to learn about their personal experience with the innovation.
2. Specify, perhaps in the IMPACT brochures (when revised), the computer requirements and computer languages used by the inventors for EXPER SIM and TIPS. A simplified explanation of the computer programs may also be needed.
3. Improve documentation to describe the specific capabilities and limitations of the four innovations. What is it that the innovation actually can do, and how? How effective are the innovations, compared to alternatives? As we showed in the

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*A communication strategy is a plan designed to change human behavior on a broad basis by transferring new ideas.

previous research question, a great number of field experiments on the innovations' effectiveness are currently under way; the results need to be pulled together and published for each innovation.

4. Develop mass media materials about the innovations for distribution to those who are interested. Films and filmstrip/tapes are available for one or two of the IMPACT innovations. Perhaps an appropriate media mix* should be developed.
5. Provide details on the application of each of the innovations to various disciplines, so as to help the IMPACT innovations break outside of their original disciplinary specialization (for details, see our findings under research question #5).
6. Evaluation of the IMPACT innovations should be more standardized. Provide the requestors and adopters with information on how they can evaluate the effectiveness of the innovations.
7. Fund workshops by other individuals than the four inventors, such as by satisfied adopters.

During the year ahead, the IMPACT program will add several additional innovations to the present four. Perhaps they might be selected so as to provide maximum contrast with EXPER SIM, Guided Design, TIPS, and Student-to-Student Counseling on certain dimensions, such as whether they deal with teaching or counseling, whether they are computer-dependent or not, whether low-cost or high-cost, etc. Comparison with the diffusion experiences of the four present IMPACT innovations could thus be instructive in learning more about the general process by which innovations diffuse in universities. The new IMPACT innovations will offer an opportunity to test certain of the possible diffusion strategies mentioned above in a kind of field experimental approach.

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*A media mix is an optimal combination of various mass media (brochures, slide-tape presentations, video tapes, audio tapes, films, etc.) instruments in order to obtain maximum effects.

Networks are units or individuals that are linked in a pattern through channels of communication. The strategic use of not only computer networks/consortia,* but also more informal interpersonal relationships (like the "invisible colleges" among college professors) might be utilized to speed the diffusion of IMPACT innovations.

Throughout the present investigation we have tended to assume that innovation-decisions are made by college professors as individuals, but we actually found considerable evidence of the importance of collective decision involving colleagues and administrators, and, more generally, of various organizational influences (like perceptions of the reward system) on the individuals' decisions about the IMPACT innovations.

Carlson (1968) stressed the fact that educational innovation occurs in organizations: "Adoption decision-making in complex organizations must differ in some important ways from individual adoption decision-making. Those who study educational innovations have an opportunity to make a substantial contribution to knowledge of diffusion by describing the way in which adoption decisions are made in complex organizations; but so far they have failed to do this."

We agree with Professor Carlson that organizational factors have to be considered more fully in studies of innovation in universities. One approach to future research on this topic would be to gather data from intact organizational groups (like all the faculty in a department) about an innovation's diffusion. Then we could better learn to understand the role of organizational and network variables in the diffusion of educational innovations. Then we could begin to form and test appropriate diffusion strategies for changing human behavior in organizational units rather than strictly through the relatively individualistic approach followed in the present investigation.

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*One of our general impressions from the present study is the potential importance of computer consortia in diffusing computer-related IMPACT innovations. For example, the CONDUIT network of universities is considering assisting their members in adopting EXPER SIM and/or TIPS. Overall, 48 per cent of the adopters interviewed said that their institution belongs to either a statewide or a national computer network/consortia.

Appendix A

DEFINITIONS OF CONCEPTS

1. Adopters: are individuals who have decided to adopt and implement one of the four IMPACT innovations.
2. Authority-innovation decisions: are forced upon an individual by someone in a superior power position.
3. Change agent: is a professional who influences innovation-decisions of individuals in a direction deemed desirable by a change agency.
4. Channel: is the means by which the message gets from a source to a receiver.
5. Collective-innovation decisions: are made by consensus among individuals in the social system.
6. Communication: is the process by which messages are transmitted from a source to a receiver with the intent to affect the receiver's behavior.
7. Communication strategy: is a plan designed to change human behavior on a broad basis by transferring new ideas.
8. Compatibility: is the degree to which an innovation is perceived as consistent with the existing values, felt needs, and past experience of the individual.
9. Complexity: is the degree to which an innovation is perceived as relatively difficult to adopt and requiring some special skills and facilities for adoption.
10. Consequences: are changes that occur within a social system as a result of the adoption or rejection of an innovation.
11. Credibility: is the degree to which a communication source or channel is perceived as trustworthy and competent by the receiver.
12. Cue-to-action: is an event in time that crystallizes an attitude into action.
13. Diffusion: is the process by which an innovation is communicated to the members of a social system.
14. Discontinuance: is a decision to cease use of an innovation after previously adopting it.

15. Effects: are the changes in receiver behavior that occur as the result of the transmission of a message.

16. Evaluation: is a type of research that is conducted to determine the effects of programs or projects, under operating conditions, in order to provide a scientific basis for decisions by the program officials.

17. Field experiment: is an active intervention by an experimenter who administers a treatment to randomly-selected respondents arranged in groups that are equivalent in the way they were chosen with at least one treatment and one control group (who do not receive any treatment).

18. Gatekeeper: is an individual located in a communication network structure so as to control the flow of messages.

19. Heterophily: is the degree to which source-receiver pairs are different in certain attributes.

20. Homophily: is the degree to which source-receiver pairs are similar in certain attributes.

21. Innovation: is an idea, practice, or object perceived as new by an individual or some other adopting unit.

22. Innovation-decision process: is the mental process through which an individual progresses from initial awareness-knowledge of an innovation to a decision to adopt or reject and finally to confirmation of this decision.

23. Innovativeness: is the degree to which an individual is relatively earlier in adopting new ideas than other members of his/her social system.

24. Interpersonal channels: are those that involve a face-to-face information exchange between a source and a receiver.

25. Inventor: is an individual who has created a new idea (or innovation).

26. Liaison: is an individual who links two or more sub-systems (cliques) in a communication system.

27. Mass media channels: are all those channels involving a mass medium such as newspapers, magazines, film, radio, and television, which enable a source of one or a few individuals to reach an audience of many.

28. Media mix: is an optimal combination of various news media instruments in order to obtain maximum effects.

29. Modification: is the degree to which the adopters of an innovation change the original innovation into a somewhat different form.

30. Networks: are units or individuals that are linked in a pattern through channels of communication.

31. Norm: is an established behavior pattern for the members of a given social system.

32. Observability: is the degree to which the results of an innovation are visible to others.

33. Opinion leadership: is the ability to informally influence attitudes and/or overt behavior of others in a desired way with relative frequency.

34. Optional-innovation decisions: are made by an individual regardless of the decisions of other members of the system.

35. Performance gap: is the condition of a system in which a difference exists between the actual condition of a system property, and the anticipation of what that condition would be in order to meet a system problem more effectively.

36. Rate of adoption: is the relative speed with which an innovation is adopted by members of a social system.

37. Receiver: is the individual intended to be the destination of a source's message(s).

38. Re-invention: is the degree to which an innovation is further developed by its adopters after its original invention.

39. Relative advantage: is the degree to which an innovation is perceived to be superior to the existing practice that it supersedes.

40. Requestors: are individuals who contacted the inventors and/or subinventors to ask for detailed information about one of the four IMPACT innovations.

41. Secondary receivers: are individuals who have learned about an IMPACT innovation through informal communication with adopters and/or information requestors.

42. Slack resources: are resources which are not already committed to other purposes.

43. Social system: is a number of individuals, or units, who are functionally differentiated and engaged in collective problem-solving with respect to a common goal.

44. Source: is the originator of the message.

45. Spontaneous adopters: are individuals who have decided to adopt an innovation either (1) prior to the IMPACT program, or (2) since the IMPACT program but without a grant from the Exxon Education Foundation.

46. Sub-inventors: are individuals who have made changes in the original innovation of the inventor.

47. Trialability: is the degree to which an innovation may be experimented with on a limited basis.

Appendix B

THE FIVE IMPACT BROCHURES MAILED BY THE EXXON EDUCATION FOUNDATION

Exxon Education Foundation

IMPACT Program: Funds to Implement Educational Innovations

Program

The Foundation's involvement in the funding of innovations has made it increasingly aware of the time lag between the development and evaluation of new educational techniques and materials and their widespread adoption by colleges and universities. Out of this awareness has grown the IMPACT (Implementation of Materials and Procedures Affecting College Teaching) program. Under IMPACT, the Foundation will disseminate information about certain educational innovations of demonstrated merit and, insofar as its funds allow, will share the cost of implementation with institutions that wish to adopt one.

Please note that because of the limitations on its resources, the Foundation must restrict its activities under IMPACT to a relatively small group of innovations of its own selection. Descriptive materials on the IMPACT innovations that the Foundation is presently offering for implementation accompany this folder and are also available from the Foundation's offices. More detailed information on each innovation may be obtained from the originator of the innovation.

During the course of the program, the Foundation will periodically revise and expand the pool of available IMPACT innovations.

Eligibility

All degree-granting two- and four-year colleges and universities qualified as tax-exempt by the Internal Revenue Service and physically located within the fifty states or the District of Columbia are eligible for grants.

Criteria

Budget restrictions make it necessary for the Foundation to review applications for IMPACT grants competitively. Some of the factors that will be considered in selecting grant recipients are:

Technical Understanding: Although the applicant is not expected to be ready to implement the innovation without further training, he should demonstrate that he has a clear understanding of its requirements, proper applications, and limitations.

Commitment to Use: The Foundation will look for evidence that the innovation, once successfully implemented, will continue to be used at the institution after the grant funds have been expended.

Institutional Support: The institution is expected to demonstrate that it is sufficiently interested in the project to commit faculty time as well as financial and other resources to the implementation.

Broad Campus Interest: Because most of the innovations supported by this program are applicable to several academic disciplines, the Foundation expects that departments other than the one where initial implementation is occurring will follow the progress of the project and be interested in applying the innovation to their disciplines where practicable.

Grants

The innovations selected by the Foundation for IMPACT dissemination will be relatively inexpensive to implement. Consequently, most grants are not expected to exceed $6,000.

All Foundation grants are made to institutions rather than to individuals.

Implementation of the innovation should be completed within a single academic year although special circumstances may cause a grant to extend for two years.

There is no limit on the number of proposals an institution may submit under IMPACT. However, the Foundation will fund only one implementation per institution of a particular innovation. A single implementation may involve more than one course if (1) those courses are taught by the same instructor; (2) it can be demonstrated that the relationship of those courses is such that simultaneous implementation is a logical way of proceeding; (3) it can be demonstrated that the innovation will be firmly established in all of the courses by the end of the grant period. Multiple separate implementations within one department or in a number of departments will not be funded nor will the Foundation fund projects proposing the creation of a general pool of funds from which various faculty members or departments would draw.

Although the Foundation will not fund more than one implementation per institution of a particular innovation, an institution may receive more than one IMPACT grant for the implementation of different innovations.

Application

Before applying for a grant, an applicant must familiarize himself with the educational innovations currently being disseminated by the Foundation under this program. If he does not already have them, he should request the descriptions of the innovations from the Foundation's offices and review them with care. When he has selected an innovation that he thinks he might like to implement on his campus, he should write to the *originator of the innovation* requesting detailed information on the material or method. After becoming thoroughly familiar with this detailed material, he should submit a project proposal in the form described below. There are two closing dates a year for the submission of applications: February 1 and July 1.

Project Proposals

Please entitle the project proposal IMPACT Program.

The following information should be supplied in the indicated sequence on no more than *four* typewritten letter-sized pages. *Six* copies of the proposal should be sent to the Foundation. *Please do not submit any other information unless specifically requested to do so.* (Note: In deciding how to respond to the following points, it will be helpful for you to review the section of this folder entitled *Criteria*.)

1. Name of institution; name, title, office address and telephone number of chief executive officer.
2. Name of department or unit in which the project is to be conducted and name of the head of that department or unit.
3. Name, title, office address and telephone number of person to be in charge of project. (The person in charge of the project should be the one who will actually be using the innovation. All Foundation correspondence about the project will be addressed to this person unless otherwise requested by the institution.)
4. Name of the educational innovation to be implemented. (Use the title found in the Foundation literature.)
5. Name of the course or program in which the innovation will be used.
6. Describe that course or program as it is now. (Include in your description the number and type of students involved; the number and type of sessions per week; the relation to the rest of the curriculum in the college or department; the mode of instruction used and the resources it requires, etc.)

➸

7. Describe the course or program as it will be following implementation of the innovation. (This description should demonstrate that you understand the basic features and requirements of the innovation and will be using the innovation in an appropriate way. If the innovation is one which requires the development of materials by the adopter, you should describe the materials to be produced in as much detail as possible.)
8. If the innovation is one which requires a computer, indicate the type available and describe its capabilities.
9. State your goals in adopting the innovation and explain how the innovation will help meet those goals.
10. Briefly describe any past attempts to meet the above goals in this course or program.
11. Describe the methods of evaluation that will be used to determine whether the goals indicated in #9 above have been achieved.
12. Present any evidence you have that the innovation may be used by others within the institution if the initial implementation proves successful. Please be as specific as possible. (This question may be inapplicable in the case of some innovations.)
13. Give a breakdown of all costs associated with the implementation, listing *separately* the amounts requested from the Foundation and those to be contributed by the institution. (Grants do not include overhead expenses. If any capital items are required, their need should be justified.)
14. Explain how the institution will maintain the innovation upon termination of Foundation funding.

→

exper sim

A system for teaching research design through computer simulation

It's no secret that traditional laboratory experience is not a very effective way of teaching students scientific method—how to ask questions and how to develop a methodology for finding answers to them. Time limitations prevent a student from performing more than a few real experiments in any given semester —hardly enough experience to learn the logic of experimental design. Furthermore, time plus cost and space restrictions prohibit students from really exploring "open-ended" research experiments, where they might have the choice of setting out after a solution in a number of different ways. Having students redo "classic" experiments, a common pedagogical response to the limitations of the laboratory, often tempts them to short-circuit the point of their laboratory tasks entirely by seeking the "right" answer in the text instead of working out their own experimental design.

EXPER SIM, a system for teaching research design and strategy through computer simulation, offers an effective and economical way around the shortcomings and problems of the traditional laboratory experience.

EXPER SIM—Some Facts

—EXPER SIM facilitates the teaching of research methodology by enabling students to run experiments on a computer which has been programmed to generate appropriate data. The computer serves as a replacement for actual data collection, saving time and obviating the need for costly laboratory space, equipment, and supervision. Students, however, design their own experiments, formulate their own research strategies, and perform their own analyses of the "raw data" received from the computer.

—The EXPER SIM master program has been constructed to allow an instructor to build his own simulations in any subject matter area or to revise the way existing EXPER SIM simulations treat a problem area. Instructors can learn to use EXPER SIM in a matter of hours.

—EXPER SIM has been mounted on a number of different computer configurations, large and small, and is available in a variety of computer languages.

The Basic Teaching Strategy

To begin with, a student is presented with background materials on the research area. In psychology, it might be learning; in chemistry, kinetics; in political science, attitudes toward foreign policy. After familiarizing himself with the field, he gets a list of the variables he may choose to examine in his research —i.e., the variables that have been entered by the professor in the computer program. For example, in a learning simulation, the variables might include rate of reinforcement, distribution of practice, and I.Q. Among the variables in a kinetics simulation might be concentration of reactants, temperature, and number and frequency of measurements. Political party, level of education, sex, and age might be variables in a simulated attitudinal study.

After studying the list of variables, the student formulates an hypothesis he would like to pursue and considers what data he would like to collect to test that hypothesis. To get the student to weigh his experimental design decisions carefully, costs, in the form of points, may be assigned to each variable. When the student has developed what he considers to be an efficient experimental design, it is fed into the computer, which, in turn, provides him with "raw" information of the sort he would have collected had he actually performed the experiment. After analyzing these data, the student plans another experiment aimed at refining his research strategy and expanding his conclusions.

How It Could Be Used

The basic EXPER SIM approach outlined above lends itself to any number of variations. One which has been successfully tried involves using the computer simulations in a game environment. In this variation, students play the role of individual researchers whose goal is to seek knowledge in the problem area and publish the results of their findings. To this end, the instructor has not only set up a schedule of costs, in points, for the various data collection decisions in an experimental design, but has also provided for a payoff in points for "publications" or lab reports. The "publications" are kept in a central library and constitute the "literature of the field." By reading this literature, a student can learn from his classmates, building upon their experience to refine his own research strategy. Within this game format, the instructor is able to foster whatever kinds of student behavior he feels are useful by varying the system of costs and payoffs. For example, by basing the payoffs for "publications" on the amount of information an individual experiment has returned, he encourages students to try out more and more sophisticated research strategies. He also encourages them to work together in research teams, since by sharing the cost of more sophisticated research they may ultimately gain larger payoffs. Through the payoff system, he can also encourage cross-criticism of experimental conclusions by providing additional payoffs to students who design experiments that challenge the findings in existing "publications." Needless to say, these are only a few of many possible strategies.

A second variation in the use of EXPER SIM grew out of the concern that students using such a simulated system would not have a proper appreciation of the difficulties involved in real data collection. In this approach, the simulated research problem is designed to parallel an existing real laboratory problem. The student first works through several rounds of the simulation to gain familiarity with the logic of experimental design, to test the adequacy of specific designs, and to learn how to handle the analysis of data. Using the insight he has gained in working with the simulation, he then collects real data in the research area.

These are only two examples of how individual instructors have modified the way they use EXPER SIM to meet their own teaching goals. A number of other variations have been developed, and, indeed, many possibilities remain to be explored.

Who Is Using It

The EXPER SIM approach to computer-simulated research design is already being used by about four dozen colleges and universities. These include California State University at Sacramento, North Carolina Educational Computing Service (connected to about forty colleges and universities), Stanford University, University of Kansas, University of Louisville, University of Michigan, Washington State University, and a number of small colleges.

For further information please contact:

Dr. Dana Main
Department of Psychology
University of Michigan
3435 Mason Hall
Ann Arbor, Michigan 48104

If you are interested in implementing EXPER SIM on your own campus, grants for this purpose are available under the Exxon Education Foundation's IMPACT program. Materials which describe the IMPACT program and explain how to apply for a grant may be obtained from the Foundation.

Exxon Education Foundation
111 West 49 Street
New York, New York 10020

8/74

guided design

A new teaching
method combining
principles of
programmed
instruction
with open-ended
problem-solving

As every educator knows, and most will admit, many of the teaching innovations of recent years have been less than completely successful. But of those that have succeeded, at least two—programmed instruction and open-ended problem-solving—have gained particularly wide acceptance, and indeed have become fixed in the academic vocabulary. Now comes a third method, called Guided Design, that carries the same promise as those earlier innovations. For Guided Design takes those two successful methods and, by combining them, fashions a new method.

Guided Design: An Introduction

Guided Design is part system, part attitude. It reshapes the traditional approach to higher education from the ground up by having students, working in small groups, attack problems rather than masses of cold information. It is based on the conviction that the student can be brought to acquire whatever factual or technical knowledge he needs as he works his way through an ascending order of well-designed problems. The central idea behind all this is that the student who is actively seeking solutions to problems rather than passively assimilating knowledge will emerge not only better educated but far stronger intellectually.

How Guided Design Works

The learning process in Guided Design revolves around students' efforts to devise solutions for a series of increasingly complex open-ended problems. While there is no single correct answer to any of the problems, each requires students to put into play certain kinds of information and skills in order to decide upon a feasible solution. The professor selects the problems according to the skills and content he wants the students to learn.

The manner in which students deal with the problems is carefully programmed. Each problem is broken down into sequenced stages or steps. Students must deal with each stage in order and are not permitted to progress to a new stage until they have adequately considered and dealt with the preceding stage or stages.

Students work in groups of from four to seven members, and it is as a group that they formulate their plan for tackling each stage. As intended by the professor in his selection and sequencing of the problem, the group quickly discovers that certain kinds of information are needed in order to make appropriate decisions. These needs have been anticipated by the preparation of a library of materials—traditional and programmed texts, reference books, audio tapes, etc.—which students are free to consult.

The group may divide the task of searching for required information among its individual members. However, the information so gathered is always brought back to the group to provide optimum conditions for group problem-solving, with its give and take of ideas, insights, and opinions.

When the group has decided upon its action for the stage of the problem under consideration, it is given written feedback materials, prepared in advance by the professor. The materials discuss a number of possible decisions the group may have reached at this point in its problem-solving, elaborating upon the strengths and weaknesses of each. The students compare the pros and cons of their decision with those of other decisions they might have made. Following this evaluation, they are allowed to advance to the next stage of the problem.

Advantages of Guided Design

By focusing on problem-solving rather than the traditional role acquisition of knowledge, Guided Design brings knowledge alive as the tool of an active mind seeking orderly solutions to complex problems. The open-ended nature of Guided Design problems and the stress on group problem-solving brings this approach even closer to "real life" experience, where few problems are susceptible to a single, black or white solution and where many different opinions and values must be considered and reconciled in the decision-making process. In sum, students not only acquire knowledge within the discipline under the Guided Design approach, but also develop their ability to learn on their own, think logically, gather the information they need to make intelligent decisions, and communicate their ideas to others.

Genesis of the Idea

Guided Design was conceived and developed at West Virginia University by Dr. Charles E. Wales, director of freshman engineering, and Dr. Robert Stager of the University of Windsor, Ontario. It was designed as a better way of teaching engineering but it became quickly apparent that it could be very well adapted to many—perhaps most—disciplines.

The Idea Grows Up and Out

After its introduction four years ago in freshman engineering at West Virginia, Guided Design was put into use in other departments at that university. It is now used in all of the undergraduate professional courses in the chemical engineering department. It has been adapted to courses in wildlife management, counseling and guidance, and a course in the history of drama. It has also served as the basis for a new interdisciplinary course on the nature of evidence, which draws elements from the sciences, social sciences, and humanities, including history, philosophy, physics, geology, and political science. Outside of West Virginia, Guided Design is being used in an educational psychology course at Purdue and is now in operation in various engineering courses at Wayne State, Wichita State, the University of Alabama, the City University of New York, the University of Missouri, Youngstown State, and the University of Michigan. It is also being used in a chemistry course at Wright State, an adult education course at Cuyahoga Community College near Cleveland, and in wildlife management at Rutgers and Cornell.

For further information please contact:

Dr. Charles E. Wales
Director of Freshman Engineering
West Virginia University
Morgantown, West Virginia 26506

If you are interested in implementing Guided Design on your own campus, grants for this purpose are available under the Exxon Education Foundation's IMPACT program. Materials which describe the IMPACT program and explain how to apply for a grant may be obtained from the Foundation.

Exxon Education Foundation
111 West 49 Street
New York, New York 10020

tips

A diagnostic tool to individualize instruction in the large class

Teachers conducting large undergraduate classes have long been concerned with, and frustrated by, their inability to deal with faltering students in time to do anything about it. Typically, a teacher of a big class will have no inkling that a student is doing poorly until a pattern emerges from quizzes and exams. The teacher lacks the resources to deal with the problem individually, and it may well be too late anyway.

A very promising way of solving this all too familiar problem has been developed at the University of Wisconsin-Madison. The Teaching Information Processing System—called TIPS—is a computer-assisted method of monitoring each individual student's progress, identifying specific weaknesses and strengths in his grasp of the subject matter, and of prescribing corrective study. The system was developed by Allen C. Kelley, who is now chairman of the department of economics at Duke, and early research shows that it is as effective as it is economical.

How TIPS Works

Help for the student

Every week or so, students take a five- or ten-minute multiple choice "survey" designed by the professor to measure their grasp of course content. These surveys are not used for grading. Their purpose is to diagnose student difficulties so that remedies may be prescribed before examinations take place.

Survey responses are entered on special forms and then fed into a computer, which measures them against "decision rules" previously prepared by the professor. From these data the computer produces separate reports for the professor, his teaching assistants, and each student.

The student's report, available in three or four hours, identifies precisely where he is doing badly or well, suggests ways past and present deficiencies might be overcome, and lays out an individually tailored assignment for the period immediately ahead.

The student who is doing well may be assigned work at a higher level or may receive an optional assignment for extra credit. Where a student shows a weakness in a particular area, an assignment directed specifically at that weakness will be made. A consistently poor student may be asked to attend review sessions.

Help for the teachers

The teaching assistants are furnished a separate report on each of their sections, so that they may vary their handling of different groups according to their performance. The reports contain detailed statistical analyses of student responses by question groupings, or concepts, and by single problems. They also list the TIPS assignments and instructions each student has received, but students' numerical scores are not shown.

The report prepared for the professor resembles those of the teaching assistants but reflects a consolidated profile of the entire class.

With TIPS, the professor and his assistants can modify their course in ways based on highly specific student feedback, a far cry from aiming instruction at some dimly perceived "average" student. Rather than depersonalizing education, TIPS uses the computer to bring teacher and student closer together, whether the student is bright or dull, motivated or indifferent. TIPS, then, is a good example of how the computer, sensitively exploited, can be made to serve education on a very personal, if not intimate, level. Far from being rigid, it can be adapted to widely divergent educational philosophies and can accommodate a nearly infinite range of teaching styles.

A Few Words About Cost

Studies conducted at Wisconsin show that TIPS adds very little to the per-student cost of a course. The increase in cost owing to computer time, teacher preparation time, and printing is largely offset by greater efficiencies in grading and faculty conference time. Overall, out-of-pocket costs of the system—including typing, mimeographing, computer time, program depreciation, and administration—have averaged approximately 75¢ per student per semester.

And an Evaluation

A controlled study involving more than 1,000 economics students produced the following findings:

- TIPS increased students achievement, as measured by course exam scores, by an average of 15 percent.
- Relatively poor students increased their performance by around 19 percent, better students by about 13 percent.
- Improvement in performance was independent of the type of questions posed on examinations—multiple choice, short answer, applied problem-solving, or essay.
- There was little hostility to the use of data processing equipment. On the contrary, 54 percent of the students appraised computers as a "significant" educational aid, and 32 percent found TIPS helped to focus attention on key concepts and areas of weakness before examinations. Only 12 percent felt that the system "did not help."

- The students' evaluations of course and professor were not influenced by the use of TIPS, even though their opinion of TIPS itself was strongly favorable.
- TIPS students were shown to retain course knowledge longer than usual, as measured two years after the course. It appears this longer retention may have resulted from better study habits engendered by the TIPS approach. Students in TIPS classes have been shown to study and review constantly throughout the semester, with relatively little reliance on cramming.
- As measured two years later, the number of students coming out of TIPS courses who chose economics as a major was 23 percent higher than normal.

Spreading the Word about TIPS

Although developed in economics, TIPS is applicable to many other disciplines, particularly those where course objectives can be measured by well-formulated, objective-type questions.

A transferable TIPS package, including a comprehensive computer program, a professor's manual, a set of professor's report forms, a user's manual, user coding forms, and related technical documentation, is presently available.

For further information please contact:
Dr. Allen C. Kelley
Department of Economics
Duke University
Durham, North Carolina 27706

If you are interested in implementing TIPS on your own campus, grants for this purpose are available under the Exxon Education Foundation's IMPACT program. Materials which describe the IMPACT program and explain how to apply for a grant may be obtained from the Foundation.
Exxon Education Foundation
111 West 49 Street
New York, New York 10020

8/74

student-to-student counseling

A systematic approach to training students as academic counselors

The enormous increase in college enrollments in the last decade, coupled with the trend toward open admission and recruitment of disadvantaged students, has made it increasingly apparent that colleges must do much more than they have been doing to maximize the likelihood that those they admit will graduate. If it is the birthright of every American to have access to a college education, it is also his right to have the help and guidance he needs to adjust to the demands of college and realize his academic potential. The failure of colleges and universities to provide effective academic counseling for incoming students is not the product of indifference. One problem is that most colleges simply cannot afford the faculty and professional staff time necessary to give students the kind of individual attention they need. Another, demonstrated by numerous studies, is that conventional freshman counseling programs—and particularly those of the "Freshman Week" variety—have little, if any, lasting effect on students' academic behavior.

This pamphlet deals with one solution to the problem of how to provide new students with personal attention and guidance over an extended period: student-to-student counseling. The approach described here, developed by William F. Brown, professor of educational psychology at Southwest Texas State University, has been shown to be both economical and effective.

Making a Student a Student Counselor

The idea of having students assist in the counseling of other students is not new. Many colleges rely on upper level students to counsel freshmen, most commonly in the area of social-personal adjustment. However, such student-counseling-student efforts tend to be unsystematic and rather informal. In contrast, Dr. Brown's approach is based on systematic training methods and materials, developed over a number of years to maximize the effectiveness of student counselor use. Under Dr. Brown's system, training of student academic counselors is accomplished through a 40-hour course of 20 two-hour sessions. While it is impossible here to describe the course in detail, some of its salient features can be enumerated. These include:

- Extensive use of role-playing exercises in addition to lectures, discussions, and demonstrations.
- Opportunity for self-criticism and self-evaluation through taping of practice sessions.
- Employment of a "buddy system", in which each inexperienced counselor is teamed up with an experienced buddy who follows him through the training cycle, showing him what to do and how to do it and offering advice and criticism.
- Use of activity sequence checklists, discussion guides, and visual aids.

Among the instructional aids that have been developed to facilitate student counselor training are a 102-page *Student Counselor's Handbook* and a sound filmstrip, *Student-to-Student Counseling to Aid Academic Adjustment*. Other materials prepared specifically to assist student counselors are *Student-to-Student Tips* and *Student's Guide to Effective Study*. Most of the student-to-student counseling materials are available in Spanish as well as English.

On the Matter of Effectiveness

The effectiveness of student-to-student counseling has been evaluated in several tightly controlled studies involving hundreds of freshman students. The experimental groups received counseling from student counselors trained in Dr. Brown's program; the control groups received no counseling. Both male and female students in the experimental groups showed significant gains on all measures of study habits and attitudes, while uncounseled students either showed no gains or lost ground. In addition, counseled students received higher grades than uncounseled students.

A further study comparing professional counselors with undergraduates trained to do student-to-student counseling revealed no significant differences in effectiveness as measured by study habits and attitudes of the counselees. However, students counseled by other students earned higher grades.

Any School Can Do It, But . . .

While Dr. Brown's training methods are highly transportable, Brown stresses that a program of student-to-student counseling is not likely to be effective unless preceded by realistic and systematic planning. One successful program cannot automatically be transferred to another campus without considering local conditions. For success, the following elements must be present:

1. Formulation of meaningful peer counseling goals. The goals of student-to-student counseling must be carefully spelled out in a manner that clearly recognizes student and institution needs, problems, and resources.

2. **Development of informed peer counseling support.** The student-to-student counseling approach must be effectively sold in a manner that assures the support and involvement of administration, faculty, and students.
3. **Delineation of realistic peer counseling activities.** The counseling activities to be performed by student counselors must be carefully defined in order to make certain that selected procedures and materials are appropriate to stated counseling objectives and to the student-to-student counseling approach.
4. **Provision of adequate peer counseling facilities.** The student-to-student counseling effort must be provided with adequate office and classroom space, properly equipped and centrally located, in order to assure efficient program operation, effective program supervision, and manifest program recognition.
5. **Selection and training of peer counseling personnel.** All personnel, professional and student, directly involved in the student-to-student counseling program must be carefully selected and given appropriate training to insure they understand the duties and responsibilities of the student counselors and the potentialities and limitations inherent in the student-to-student counseling approach.
6. **Supervision of peer counseling activities.** The ongoing program of student-to-student counseling activities must be continually supervised by professional personnel workers in order to assure efficient, realistic, and coordinated program operation.
7. **Evaluation and revision of peer counseling effort.** All aspects of the student-to-student counseling program must be evaluated systematically and the individual counseling activities eliminated, revised, or expanded, as appropriate, on the basis of their proven effectiveness.

Who Has Used It

Student-to-student counseling is being used at six institutions in Texas besides Southwest Texas State. Programs have also been started in Mexico and Spain, thanks to the availability of the materials in Spanish.

For further information please contact:

Dr. William F. Brown
Department of Education
Southwest Texas State University
San Marcos, Texas 78666

If you are interested in implementing Student-to-Student Counseling on your own campus, grants for this purpose are available under the Exxon Education Foundation's IMPACT program. Materials describing the IMPACT program and the grant application procedure may be obtained from the Foundation.

Exxon Education Foundation
111 West 49 Street
New York, New York 10020

11/73

Appendix C

REQUESTOR QUESTIONNAIRE AND LETTER

Department of Journalism

THE UNIVERSITY OF MICHIGAN • ANN ARBOR • 48104

November 20, 1974

Dear Colleague:

Have a cup of coffee on me. And while you drink it, please read this letter and fill out the enclosed questionnaire.

We are writing you to ask you for help in a research study of the diffusion of four educational innovations that have been supported with funds from the Exxon Education Foundation. We are studying the process through which these four innovations have, and are currently spreading among university faculty and staff in the U.S.

The four innovations are:

1. EXPER SIM--a system for teaching research design through computer simulation--developed by Dr. Dana Main, Department of Psychology, University of Michigan;

2. Guided Design--a teaching method combining principles of programmed instruction with open-ended problem-solving--developed by Dr. Charles E. Wales, Director of Freshman Engineering, West Virginia University;

3. TIPS--a diagnostic tool to individualize instruction in the large class--developed by Dr. Allen C. Kelley, Department of Economics, Duke University;

4. Student-to-Student Counseling--a systematic approach to training students as academic counselors--developed by Dr. William F. Brown, Department of Education, Southwest Texas State University. (PLEASE NOTE THAT THE ATTACHED QUESTIONNAIRE ONLY DEALS WITH DR. BROWN'S STUDENT-TO-STUDENT COUNSELING, RATHER THAN OTHER PEER COUNSELING PROGRAMS.)

We believe that you have requested information about at least one of these innovations. In order to refresh your memory, we have enclosed a brochure about each of the innovations that you have requested.

Your response is very important to us, whether or not you have decided to use any of them. We have enclosed a brief questionnaire asking about your experience with these innovations. Our special interest is in how you learned about the innovation(s) that you requested, what factors entered into your decision about it, and with whom you have talked about it.

For your convenience, we have enclosed a return envelope. We hope you will take the 10 minutes today required to complete the questionnaire. If you have any questions about our study or about the questionnaire, I wish you would call me collect at 313-763-1584.

The information you supply will not be connected with your name in any way, and we shall treat it with utmost confidence.

Cordially,

Everett M. Rogers, Ph.D.
Professor

P.S. In case you only requested this information for someone else at your institution, please pass along this questionnaire.

November 20, 1974

DIFFUSION OF "IMPACT" INNOVATIONS

I. First of all, we want to ask you about your experience with any of the four "IMPACT" innovations.

1. Have you received a copy of one of the Exxon Education Foundation IMPACT brochures about the four innovations [IDENTICAL TO THE ENCLOSED BROCHURE(S)]?

   ☐ No

   ☐ Yes ------

   1a. (IF YES) From whom did you receive it?

   ☐ It was passed along by your department chairman, other administrators(e.g., dean, vice-president, or director of counseling center), or colleagues.

   ☐ Directly through the mail from the Exxon Education Foundation.

   ☐ It was passed along by your university's research administration or special project development office.

   ☐ Other (PLEASE SPECIFY: ______________

   ____

   ______________________________________)

2. Where or from whom did you first hear about the innovation(s)?

   ☐ The IMPACT brochure from the Exxon Education Foundation

   ☐ Department Chairman

   ☐ Other administrator (e.g., dean, vice-president, etc.)

   ☐ A professional conference or seminar

   ☐ Journal articles (PLEASE SPECIFY: ______________________

   ____)

   ☐ Colleague in your field (PLEASE TELL US HIS NAME, DEPARTMENT, and INSTITUTION:

   ____

   ____)

   ☐ Other sources (PLEASE SPECIFY:

   ____

   ____)

3. When did you first hear about the innovation(s)?

____________ (Month) ____________ (Year)

4. Have you requested further information about at least one of the four IMPACT innovations from Dana Main, Charles E. Wales, Allen C. Kelley, or William F. Brown?

☐ No

☐ Yes ----→

4a. (IF YES) Which innovation(s) have you requested information about?

☐ EXPER SIM (Dana Main)

☐ Guided Design (Charles E. Wales)

☐ TIPS (Allen C. Kelley)

☐ Student-to-Student Counseling (William F. Brown)

4b. (IF YES) What were the most important reasons that prompted you to request information about the innovation(s)?

(1) ______________________________

____

(2) ______________________________

____

(3) ______________________________

____

5. We would like to mail questionnaires to everyone who already knows about the innovation(s) and is interested in considering use of the innovation(s). To do this we need your help. With whom have you discussed the innovation(s)?

5a. Colleague(s) in your department or unit?

☐ No

☐ Yes ----→ (IF YES) Who? (PLEASE TELL US HIS NAME)

EXPER SIM: ______________________________

Guided Design: ______________________________

TIPS: ______________________________

Student-to-Student Counseling: ______________________________

____

5b. Colleague(s) elsewhere in your institution?

☐ No

☐ Yes ----> (IF YES) Who? (PLEASE TELL US HIS NAME AND DEPARTMENT)

EXPER SIM: ____________________

____

Guided Design: ____________________

____

TIPS: ____________________

____

Student-to-Student Counseling: ____________________

____

____

5c. Colleague(s) in other institutions?

☐ No

☐ Yes ----> (IF YES) Who? (PLEASE TELL US HIS NAME, DEPARTMENT, AND INSTITUTION)

EXPER SIM: ____________________

____

____

Guided Design: ____________________

____

____

TIPS: ____________________

____

____

Student-to-Student Counseling: ____________________

____

____

____

II. Now we want to ask you about EXPER SIM--a system for teaching research design through computer simulation--developed by Dana Main at the University of Michigan.

1. Have you adopted (that is, actually used) EXPER SIM?
   - ☐ Yes
   - ☐ No

   1a. (IF NO) Do you have specific plans to adopt EXPER SIM during the academic year 1974-75?
   - ☐ No
   - ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting EXPER SIM?
   - ☐ Unavailability of trained personnel (e.g., teaching assistant, computer programmer, etc.) to implement
   - ☐ Unavailability of funds to adopt
   - ☐ Lack of support from administrators
   - ☐ Overly time-consuming or lack of release time
   - ☐ Does not fit the subject matter of your course(s)
   - ☐ Your computer is not appropriate
   - ☐ Lack of transferable computer programs
   - ☐ Your doubts about the usefulness of computer-related instructional approach
   - ☐ Students' attitudes toward computer-use
   - ☐ Other (PLEASE SPECIFY: ______________________________)

2. Have you used a computer for--

   2a. Research purposes
   - ☐ No
   - ☐ Yes

   2b. Teaching purposes
   - ☐ No
   - ☐ Yes

3. Do you have any suggestions for strategies to facilitate the implementation of EXPER SIM?

____

II. Now we want to ask you about Guided Design--a teaching method combining principles of programmed instruction with open-ended problem-solving--developed by Charles E. Wales at West Virginia University.

1. Have you adopted (that is, actually used) Guided Design?

   ☐ Yes

   ☐ No

   1a. (IF NO) Do you have specific plans to adopt Guided Design during the academic year 1974-75?

   ☐ No

   ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting Guided Design?

   ☐ Unavailability of trained personnel (e.g., teaching assistant, etc.) to implement

   ☐ Unavailability of funds to adopt

   ☐ Lack of support from administrators

   ☐ Overly time-consuming or lack of release time

   ☐ Does not fit the subject matter of your course(s)

   ☐ Unavailability of appropriate teaching materials

   ☐ Other (PLEASE SPECIFY: ____________________

   ____

   ____)

2. Do you have any suggestions for strategies to facilitate the implementation of Guided Design?

____

____

____

____

II. Now we want to ask you about TIPS--a diagnostic tool to individualize instruction in the large class--developed by Allen C. Kelley at Duke University.

1. Have you adopted (that is, actually used) TIPS?

   ☐ Yes

   ☐ No

   1a. (IF NO) Do you have specific plans to adopt TIPS during the academic year 1974-75?

   ☐ No

   ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting TIPS?

   ☐ Unavailability of trained personnel (e.g., teaching assistant, computer programmer, etc.) to implement

   ☐ Unavailability of funds to adopt

   ☐ Lack of support from administrators

   ☐ Overly time-consuming or lack of release time

   ☐ Does not fit the subject matter of your course(s)

   ☐ Your computer is not appropriate

   ☐ Lack of transferable computer program

   ☐ Your doubts about the ability of multiple-choice questions to measure your course content

   ☐ Other (PLEASE SPECIFY: ________________

   ____

   ____)

2. What students do you think need the most help from a college teacher?

   ☐ Students with top grades

   ☐ Average students

   ☐ Students with poor grades

3. Do you think that TIPS would enable you to reach this group?

   ☐ No

   ☐ Yes

(OVER)

4. Have you used a computer for--

   4a. Research purposes

   ☐ No

   ☐ Yes

   4b. Teaching purposes

   ☐ No

   ☐ Yes

5. Do you have any suggestions for strategies to facilitate the implementation?

II. Now we want to ask you some questions about Student-to-Student Counseling--a systematic approach to training students as academic counselors--developed by William F. Brown at Southwest Texas State University.

1. Have you adopted (that is, actually used) Student-to-Student Counseling?
   - ☐ Yes
   - ☐ No

   1a. (IF NO) Do you have specific plans to adopt Student-to-Student Counseling during the academic year 1974-75?
   - ☐ No
   - ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting Student-to-Student Counseling?
   - ☐ Unavailability of trained personnel (e.g., counseling assistant, etc.) to implement
   - ☐ Unavailability of funds to adopt
   - ☐ Lack of support from administrators
   - ☐ Overly time-consuming or lack of release time
   - ☐ Your doubts about the effectiveness of students as counselors
   - ☐ Other (PLEASE SPECIFY: ____________________
     ____
     ____________________)

2. About how many students have received counseling services through your unit during the academic year 1973-74?

   ____________ students

3. How many years of college-level counseling experience have you had?

   ____________ years

4. Do you have any suggestions for strategies to facilitate the implementation of Student-to-Student Counseling?

   ____

   ____

   ____

   ____

III. Finally, we would like to ask you something about yourself and your institution; this information will be held in confidence.

1. What is your highest completed degree?

   ☐ Bachelors

   ☐ Master's

   ☐ Specialist, or Master's plus about 30 credits

   ☐ Doctorate

2. What is your academic field of specialization?

   ____

3. What is your academic rank? (CHECK MORE THAN ONE, IF APPLICABLE)

   ☐ Instructor

   ☐ Assistant professor

   ☐ Associate professor

   ☐ Professor

   ☐ Department chairman

   ☐ Administrator (e.g., vice-president, dean, director of counseling center, etc.) (PLEASE SPECIFY:

   ______________________________________)

   ☐ Professional staff (e.g., grant coordinator, counselor, etc.) (PLEASE SPECIFY:

   ______________________________________)

   ☐ Other title (PLEASE SPECIFY: ______________________

   ______________________________________)

4. How many years have you been at your present institution?

   ________ years

5. Did you teach at least one course during the past academic year 1973-74?

   ☐ No

   ☐ Yes ---

   5a. (IF YES) What was the enrollment in the largest class that you taught?

   ________ Students

5. (continued)

5b. (IF YES) Did you use any of the following techniques in this course?

☐ No ☐ Yes Instructional TV and/or videotape

☐ No ☐ Yes Overhead projector

☐ No ☐ Yes Simulation, instructional games, and/or role-playing

☐ No ☐ Yes Contract grading

☐ No ☐ Yes Computer-assisted instruction

☐ No ☐ Yes Programmed instruction and/or other printed self-instructional materials

☐ No ☐ Yes Small group discussion

6. What is your sex?

☐ Male

☐ Female

7. What is your age?

____________ years

8. What relative weight is given to effective teaching, versus research and publication, when a faculty member in your unit (such as a department) is considered for a promotion or a raise? PLEASE DISTRIBUTE 100 POINTS BETWEEN THESE TWO ALTERNATIVES, DISREGARDING COMMUNITY SERVICE AND OTHER RESPONSIBILITIES:

____________% Teaching

____________% Research and publication

9. Would you like to receive a summary of the results of this investigation?

☐ No

☐ Yes

9a. (IF YES) Please give your name and mailing address:

- -

Name: ______________________________

Mailing Address: ______________________________

____

____

THANK YOU VERY MUCH FOR YOUR COOPERATION.

Appendix D

LETTER TO REQUESTORS THAT ACCOMPANIED SECOND WAVE QUESTIONNAIRE

Department of Journalism
THE UNIVERSITY OF MICHIGAN • ANN ARBOR • 48104

A RESEARCH PROJECT ON THE DIFFUSION OF IMPACT INNOVATIONS TO COLLEGE PROFESSORS

January 3, 1974

Dear Colleague:

I am writing to remind you that we sent you a questionnaire about a month ago about your interest in one or more of the four IMPACT innovations: EXPER SIM, Guided Design, TIPS, and Student-to-Student Counseling. In case that you forgot to return your questionnaire to us, I urge you to do so today. We enclose a copy of the questionnaire and a stamped, self-addressed envelope.

Your response is very crucial to the success of our study, and ultimately to an improved understanding of the diffusion of educational innovations. We have already received about a 70 per cent response to the first mailing of the questionnaire, and with your help we hope to achieve an almost complete response rate. The attached questionnaire is the last mailing to you. It will only take about 5 to 10 minutes of your time (about as long as the time needed to drink a cup of coffee).

Let me reiterate our assurance that your response will be treated with utmost confidence, and that your name will not be linked with your responses in any way. We will also be delighted to supply you with a summary report of our findings when this study is finished.

If your response is already enroute to us, please disregard this reminder. If you have questions regarding this questionnaire or our study, please call me collect at (313) 763-1584.

Cordially,

Everett M. Rogers
Professor

EMR: hb
enclosure

Appendix E

PERSONAL INTERVIEW GUIDES FOR EXPER SIM, GUIDED DESIGN, TIPS, AND STUDENT-TO-STUDENT COUNSELING

October 23, 1974

EXPER SIM

Personal Interview Guide

I. HISTORY AND KNOWLEDGE

1. Would you please tell me the history of how you came to adopt (know about) EXPER SIM?

   a. How did you first become interested in EXPER SIM? Why?

   b. Did you perceive a need for change before you learned of EXPER SIM? (Were you dissatisfied with the course or method of teaching before you learned of it?)

   OR

   c. Did you feel that there was a need for the innovation after learning of EXPER SIM?

   d. Had you already made some changes in your course, and then perceived EXPER SIM to be an additional improvement?

   e. About when did you first hear about EXPER SIM?

   f. How well do you feel EXPER SIM fits your course needs?

2. In the decision to adopt EXPER SIM, who else, besides yourself, was involved?

   a. Who initiated consideration of EXPER SIM?

   b. From whom did you receive approval?

   c. From whom did you receive cooperation?

   d. Where, or from whom, did you obtain information about EXPER SIM that convinced you to adopt it?

   e. Is anyone else involved in using EXPER SIM who has played an important role?

II. PLANS TO USE EXPER SIM

3. When do you expect to start using EXPER SIM?

    a. Month/Term

    b. Year

4. In what course(s) have you used, or do you plan to use, EXPER SIM?

    a. Course

    b. Level

    c. Enrollment:

        1. average for each section

        2. total for the year

5. To what extent do you use EXPER SIM?

    a. In what proportion of the courses you teach are you using, or do you plan to use, EXPER SIM?

    b. How much of your class time, during the term, is devoted to using EXPER SIM?

III. COMPUTER KNOWLEDGE

6. Do you know computer programming?

7. What type (make and model) of computer do you have at your institution? (7 IF ANSWERED NEED NOT ASK 9).

8. What computer languages do you know?

9. What is your computer system (make and model)?

(For MESS) IBM-360
DEC 10
CDC 3300
Others

(For LESS) DEC-PDP9
HP 2000 C, F or (G-coming out in Nov., 1974)

10. Do you use the same language as used in MESS and/or LESS?

    (a) FORTRAN

    (b) BASIC

    (c) Others

11. What was the initial cost of installing EXPER SIM on your computer system?

    (a) Computer costs?

    (b) Programmer costs?

    (c) Others

12. Does your use of EXPER SIM require a lot of computer knowledge by

    (a) You

    (b) Teaching Assistant

    (c) Student

    (d) Secretaries

    (e) Others

13a. Does your Institution belong to a computer consortium (e.g. CONDUIT)?

13b. Does your Institution belong to a computer network (e.g. NCRCN)?

14. Have you used any other program (e.g. KUSIM (Hallenbeck), DATA-CALL, etc.)? If so, please give us

    (a) Name

    (b) Department

    (c) Address

15. Who assisted you in the implementation of EXPER SIM on your computer system?

    (a) No one

    (b) Computation center at your institution

    (c) Colleagues

    (d) Student programmer

    (e) (1) Dana Main's staff - MESS

        (2) Art Cromer's staff - LESS

    (f) Others (ASK FOR NAME, ADDRESS OF SPECIFIC INDIVIDUAL)

IV. SPECIFIC INFORMATION ON EXPER SIM

16. How closely do you follow, or do you plan to follow, Dana Main's MESS program/or Art Cromer's LESS program?

17. Have you used the MESS, LESS, or other models, or have you written your own?

    a. If borrowed: 1) Which ones? 2) Were modifications made?

    b. If written, what is the model?

18. What is the nature of the data that a student is provided on your EXPER SIM approach?

19. What is the nature of the data that a student must generate?

20. To what extent has the use of this innovation encouraged you to formulate specific course objectives, and to implement them?

21. How much effort on your part does it take to design creative simulation problems?

22. What are the costs, per student, of using EXPER SIM?

    a. In dollars? (In materials?)

    b. In time, i.e., instructor's, assistants', students'?

23. What are the comparative costs, per student, of using EXPER SIM and other methods of teaching?

24. a. What do you expect the time and cost benefits will be of using EXPER SIM?

    b. How have you made these estimates?

25. How do you introduce EXPER SIM to your students?

V. EVALUATIVE DATA

26. Do you think that EXPER SIM improves a student's ability to conduct experimental research?

27. How do the students like this method of teaching?

28. Who benefits most from the use of EXPER SIM, the weaker or the better student?

29. a. Do you use the better students in your course to tutor other students?

    b. Does this occur in group discussion in class only, or outside of class?

30. How well does EXPER SIM accomodate the diverse nature and large size of your class?

31. What are the main advantages and disadvantages of using EXPER SIM, as compared with other methods of teaching?

32. Have you kept, or do you plan to keep, data on comparisons of pre- and post-EXPER SIM use on variables such as:

    a. Teaching effectiveness?

    b. Student motivation?

    c. Learning activity?

    d. Others?

VI. OPINIONS AND RESISTANCES

33. How is EXPER SIM perceived by the following persons?

    a. Your dean?

    b. Your department chairman?

    c. Colleagues in your department?

    d. Colleagues in other departments?

    e. Graduate students?

    f. Students in your classes?

    g. Others?

34. Do you know of anyone who used EXPER SIM, and then discontinued? Why? Please give name, dept., institution.

35. Do you feel that the emphasis your institution places on research and publication vs. teaching effectiveness is about right?

36. Do you feel that you are properly rewarded for being a good teacher, even if it interferes with your research and publication activities?

37. Do you think that your use of EXPER SIM will help or hinder your career?

38. Does your dean or department chairman have data on your teaching effectiveness?

39. a. Do your students fill out a teacher-evaluation form in your course?

    b. Is it submitted to your department chairman?

VII. GRANT PROPOSAL APPLICATION

40. How did you decide to make a grant proposal to the Exxon Education Foundation?

41. Did anyone assist you in preparing your grant application?

    a. No one

    b. Research Administration staff

    c. Department chairman

    d. Colleagues in your department

    e. Others

42. Do you feel that the Exxon limit of $6,000 was a serious limitation in making your proposal?

VIII. PERSONAL DATA AND DIFFUSION ACTIVITIES

43. How many years have you been teaching at the college level?

44. What conferences, workshops, and seminars on EXPER SIM have you attended?

45. How have you tried to spread the use of EXPER SIM?

    a. Given workshops?

    b. Written articles, papers?

    c. Others?

46. Have you received and read Dana Main's and /or Art Cromer's literature on EXPER SIM?

47. Do you have suggestions for speeding the wider adoption of EXPER SIM?

October 14, 1974

Guided Design

Personal Interview Guide

I. HISTORY AND KNOWLEDGE

1. Would you please tell me the history of how you came to adopt (know about) Guided Design?

   a. How did you first become interested in G.D.? Why?

   b. Did you perceive a need for change before you learned of G.D.? (Were you dissatisfied with the course or method of teaching before you learned of it?)

   OR

   c. Did you feel that there was a need for the innovation after learning of G.D.?

   d. Had you already made some changes in your course, and then perceived G.D. to be an additional improvement?

   e. About when did you first hear about G.D?

   f. How well do you feel G.D. fits your course needs?

2. In the decision to adopt G.D., who else, besides yourself, was involved?

   a. Who initiated consideration of G.D.?

   b. From whom did you receive approval?

   c. From whom did you receive cooperation?

   d. Where, or from whom, did you obtain information about G.D. that convinced you to adopt it?

   e. Is anyone else involved in using G.D. who has played an important role?

II. PLANS TO USE GUIDED DESIGN

3. When do you expect to start using G.D.?

   a. Month/Term

   b. Year

4. In what course(s) have you used, or do you plan to use, G.D.?
    a. Course
    b. Level
    c. Enrollment:
        1. average for each section
        2. total for the year

5. To what extent do you use G.D.?
    a. In what proportion of the courses you teach are you using, or do you plan to use, G.D.?
    b. How much of your class time, during the term is devoted to using G.D.?

III. SPECIFIC INFORMATION ON GUIDED DESIGN

6. How closely do you follow, or do you plan to follow, Dr. Wales' systems design and projects, e.g., "Bridge Freezes Before Road Surface?" Do you use his materials?

7. Have you borrowed a project similar to Professor Wales'?
    a. From whom? (Please give name, dept., institution.)
    b. What is the project?
    c. Have you made modifications on it?

8. Have you prepared your own project(s)? Please describe it (them).

9. How much effort on your part does it take to design a creative project?

10. What is the nature of the data that a student is provided in your G.D. approach?

11. What is the nature of the data that a student must generate?

12. To what extent has the use of this innovation encouraged you to formulate specific course objectives, and implement them?

13. What were the main issues in your decision to use G.D.?

14. How do you introduce G.D. to your students?

15. What is/was the initial cost of implementing the G.D. program?

16. What are the costs, per student, of using G.D.?

    a. In dollars? (In materials?)

    b. In time, i.e., instructor's, assistants', students'?

17. What are the comparative costs, per student, of using G.D. and other methods of teaching?

18. a. What do you expect the time and cost benefits will be of using G.D.?

    b. How have you made these estimates?

IV. EVALUATIVE DATA

19. Do you think that G.D. improves a student's ability to make decisions?

20. How do students like this method of teaching?

21. Who benefits most from the Guided Design Systems approach, the weaker or the better student?

22. a. Do you use the better students in your course to tutor other students?

    b. Does this occur in group discussion in class only, or outside of class?

23. How well does G.D. accomodate the diverse nature and large size of your class?

24. What are the main advantages and disadvantages of using G.D., as compared with other methods of teaching?

25. Have you kept, or do you plan to keep, data on comparisons of pre- and post-Guided Design use on variables such as:

    a. Teaching effectiveness?

    [illegible]. Student motivation?

    c. Learning activity?

    d. Others?

V. OPINIONS AND RESISTANCES

26. How is G.D. perceived by the following persons?

    a. Your dean?

    b. Your department chairman?

    c. Colleagues in your department?

    d. Colleagues in other departments?

    e. Graduate students? (T.A.'s)

    f. Students in your classes?

    g. Others?

27. Do you know of anyone who has used G.D., and then discontinued? Why? Who? (Please give name, dept., and institution?)

28. Do you feel that the emphasis your institution places on research and publication vs. teaching effectiveness is about right?

29. Do you feel that you are properly rewarded for being a good teacher, even if it interferes with your research and publication activities?

30. Do you think that your use of G.D. will help or hinder your career?

31. Does your dean or department chairman have data on your teaching effectiveness?

32. a. Do your students fill out a teacher-evaluation form in your course?

    b. Is it submitted to your department chairman?

VI. GRANT PROPOSAL APPLICATION

33. How did you decide to make a grant proposal to the Exxon Education Foundation?

34. Did anyone assist you in preparing your grant application?

    a. No one

    b. Research administration staff

    c. Department chairman

    d. Colleagues in your department

    e. Others

35. Do you feel that the Exxon limit of $6,000 was a serious limitation in making your proposal?

VII. PERSONAL DATA AND DIFFUSION ACTIVITIES

36. How many years have you been teaching at the college level?

37. What conferences, workshops, and seminars on G.D. have you attended?

38. How have you tried to spread the use of G.D.?

    a. Given workshops?

    b. Personal correspondence?

    c. Written articles, papers?

    d. Others?

39. Have you received and read Charles Wales' literature on G.D.?

    a. What was most useful?

    b. What was least useful?

    c. What additional information would have been valuable?

40. Do you have suggestions for speeding the wider adoption of G.D.?

October 10, 1974

TIPS

Interview Guide

I. HISTORY AND KNOWLEDGE OF TIPS

1. Would you please tell me the history of how you came to adopt (know about) TIPS?

    (a) How did you first become interested in TIPS? Why?

    (b) Was there a felt need prior to your adoption that TIPS met?

    (c) Did you feel (decide) that knowledge of TIPS created a need for the innovation?

    (d) When did you hear about TIPS?

    (e) How well do you feel that TIPS fits your course needs?

    (f) Had you already made some changes in your course, and then perceived TIPS to be an additional improvement?

2. In the decision to adopt/use TIPS who else was involved? What role did he/she/they play?

    (a) Who initiated consideration of TIPS?

    (b) From whom did you receive approval?

    (c) From whom did you receive cooperation?

    (d) Was any one else involved who played an important role?

II. PLANS TO USE

3. When do you expect to start using TIPS? (When did you start using TIPS?)

    (a) Month/term

    (b) Year

4. In what courses have you used or plan to use TIPS?

    (a) course(s)

(continued...)

4. (continued)

   (b) Level

   (c) Enrollment

   (i) Average for each section

   (ii) Total for the year

5. How much of your total class time during the term is devoted to using TIPS?
   (a) In what proportion of the courses you teach are you using or do you plan to use TIPS?

III. COMPUTER KNOWLEDGE

6. Do you know computer programming?

7. What type (make and model) of computer do you have at your institution? (7 IF ANSWERED NEED NOT ASK 9).

8. What computer language(s) do you know?

9. What is your computer system(make and model)?

   IBM 360 series, 20, 25, etc.
   IBM 370 series
   UNIVAC 1100 series
   UNIVAC 1108 series
   CDC 3000 series
   CDC 6000 series

10. Do you use the same language as the one used in Prof. Kelley's program?

    FORTRAN IV
    UNIVAC FORTRAN V computer
    Others

11. What was the initial cost of installing TIPS on your computer system?
    (a) Computer costs?

    (b) Programmer costs?

    (c) Others

12. Does your use of TIPS require a lot of computer knowledge by

    (a) You

    (b) Teaching Assistant

    (c) Student

    (d) Secretaries

    (e) Others

13a. Does your Institution belong to a computer consortium (e.g. CONDUIT)?

13b. Does your Institution belong to a computer network (e.g. NCRCN)?

14. Have you used any other program (e.g. CHEM-TIPS, TIPSLESS, RSVP)? If so, please give us

    (a) Name

    (b) Department

    (c) Address

15. Who assisted you in the implementation of TIPS on your computer system?

    (a) No one

    (b) Computation center at your institution

    (c) Colleagues

    (d) Student programmer

    (e) Kelley and staff

    (f) Others (ASK FOR NAME, ADDRESS OF SPECIFIC INDIVIDUAL)

IV. SPECIFIC INFORMATION ON INNOVATION

16. How do you introduce TIPS to the students?

17. How closely do you follow or plan to follow Prof. Kelley's design of TIPS?

18. How much effort does it take on your part to prepare multiple choice questions for the weekly surveys as compared to your previous methods of assignment preparation?

19. What do you expect time cost benefits of TIPS will be?

V. EVALUATIVE DATA

20. What is the comparative cost of using TIPS and other (previous) methods of teaching?

21. To what extent did the use of TIPS encourage you to formulate specific course objectives and implement them?

22. Will you use or plan to use TIPS for feedback on student performance during the term, and/or evaluation purposes?

23. How well do students like this method of teaching?

24. How well does TIPS accomodate the diverse nature and large size of freshman classes?

25. Who do you feel is most benefited by TIPS?

(a) Weaker students

(b) Better students

26. Do you use better students to tutor other students (peer tutoring)?

27. What are some of the main advantages of using TIPS as compared to other methods?

28. Have you kept or plan to keep data on pre- and post-TIPS on variables such as

(a) Teaching effectiveness

(b) Student motivation

(c) Learning activity (retention)

(d) Others

29. What is the cost per student using TIPS?

30. Do you know of anyone who used TIPS and then discontinued? Why?

Name

Department

Address

V. RESISTANCES/OPINIONS

31. How was TIPS perceived by the following persons?

(a) Dean

(b) Dept. chairman

(c) Colleagues in the dept.

(d) Colleagues in other depts.

(e) Graduate students/T.A.

(f) Other students in class(es)

(g) Any other

32. Do you feel that the emphasis that your institution places on research and publication versus teaching effectiveness is about right?

33. Do you feel you are properly rewarded for being a good teacher, even if it interferes with your research and publication activities?

34. Has your teaching effectiveness been a help or hindrance in your academic career?

35. Does your dean or department chairman have data about your teaching effectiveness?

36. Do your students fill out a teacher-evaluation form in your class which is sent to the dean or chairman?

VI. GRANT PROPOSAL WRITING

37. How did you decide to make a grant proposal to the Exxon Educational Foundation?

38. Did anyone assist you in preparing your grant application?

    (a) No one

    (b) Research administration staff

    (c) Department chairman

    (d) Colleagues in the department

    (e) Others

39. Do you feel that the Exxon limit of $6,000 was a serious limitation in making your proposal?

VII. PERSONAL DATA AND DIFFUSION ACTIVITIES

40. How long have you been teaching at the college level?

41. What conferences, workshops, and seminars on TIPS have you attended?

42. How have you tried to spread the practice of TIPS?

    (a) Personal conversation/ correspondence

    (b) Given workshop

    (c) Written paper

    (d) Others

43. Have you received/read Prof. Kelley's literature on TIPS?

    (a) What was most useful?

    (b) What was least useful?

    (c) What additional information would have been valuable?

44. Do you have suggestions for speeding the wider adoption of TIPS?

45. Are there any ethical problems involved in the use of TIPS?

October 15, 1974

STUDENT-TO-STUDENT COUNSELING

INTERVIEW GUIDE

I. HISTORY/KNOWLEDGE

1. Would you please tell me the history of how you came to adopt (know about) S-S-C?

   (a) How did you first become interested in S-S-C? Why?

   (b) Was there a felt need prior to the adoption that S-S-C met?

   (c) Did you (decide) feel that the knowledge of S-S-C created a need for the innovation?

   (d) About when did you hear about S-S-C?

   (e) Had you already made some changes in counseling, and then perceived S-S-C to be an additional improvement?

   (f) How well do you feel S-S-C fit the needs of your counseling program?

2. In the decision to adopt/use S-S-C who else was involved? What role did he/she/they play?

   (a) Who initiated consideration of S-S-C?

   (b) From whom did you receive approval?

   (c) From whom did you receive cooperation?

   (d) Is anyone else involved who played an important role?

II. PLANS TO USE

3. When do you expect to start using S-S-C? (or when did you start using S-S-C)?

   (a) Month/term

   (b) Year

4. What level of students are student counselors to the freshman students?

   (a) Sophomores

   (b) Juniors

   (c) Seniors

   (d) Graduate students

   (e) Others ________________________________

5. How many students are there who received counseling in the past academic year at your institution? How many of these were counseled by students?

6. In what places are student counselors used?

   (a) Residence halls?

   (b) Student social center?

   (c) Student religion center?

   (d) Instructional departments?

   (e) Study habit clinic?

   (f) Testing and counseling center?

   (g) Others? ________________________________

7. What is the student/counselor ratio at your institution?

III. COUNSELING EXPERIENCE

8. What training have you had in counseling?

9. What are your counseling experiences at various levels?

   (a) Primary/Secondary level?

   (b) Public School level?

   (c) College level?

   (d) Others? ________________________________

IV. SPECIFIC INFORMATION ON INNOVATION

10. How do you introduce S-S-C to the students (clients)?

11a. What techniques do you use in training your student counselors?

11b. What is the total training time provided for student counselors?

11c. How do you recruit/select your student counselors?

11d. What is the cost of training your student counselors?

(a) in Faculty time

(b) in dollars

(c) in the preparation of materials

(d) Others ____________________

12. What are the various techniques that student counselors use with other students?

(a) Group discussion?

(b) Lectures?

(c) Demonstrations?

(d) Reading assignments?

(e) Role-playing?

(f) Practice exercise?

(g) Peer system rating?

(h) Others ____________________

13. What were/are the various types of professional counselors in your institution?

(a) Student residence hall counselors?

(b) Faculty advisor?

(c) Academic counselor?

(d) Others? ____________________

14. How closely do you follow or plan to follow Prof. Brown's S-S-C design? Do you use the printed materials such as:

    (a) Student Evaluation test?

    (b) Counselors Manual?

    (c) Others? ______________________ ____________________

15. Did you prepare materials for your student counselors to use in counseling other students? What are they?

16. Have you made any modifications in Prof. Brown's approach to S-S-C?

17. What do you expect time and cost benefits of using student counselors will be?

IV. EVALUATIVE DATA

18. How valuable do you think peer counseling really is?

19. What is the comparative cost of using S-S-C and other (previous) methods?

20. To what extent did the use of the innovation encourage you to formulate specific counseling objectives and implement them?

21. What are the areas of college life that are covered in your use of students as counselors?

    (a) Orientation to school

    (b) Personal-social problems

    (c) Study habits

    (d) Subject matter counseling

    (e) Religious counseling

    (f) Education programs planning

    (g) Vocational guidance

(continued)

21. (continued)

    (h) Psychological test interpretation

    (i) Others ____

22. How well do students like this method of counseling?

23. Do you think that the use of S-S-C will reduce the drop-out rate of students?

24. Who do you feel is most benefited by S-S-C?

    (a) Weaker students

    (b) Better students

25. How well does S-S-C accomodate the diverse nature and large size of freshman classes?

26. What are some of the main advantages and disadvantages of using student counselors as compared to using professional counselors?

27. Have you kept or plan to keep data on comparisons of pre- and post-S-S-C on variables such as:

    (a) Counseling effectiveness

    (b) Student motivation

    (c) Learning activity

    (d) Drop-out rates

    (e) Others ____

28. What is the cost per student using counseling services?

29. How is the student counselor payed for his services as a counselor?

    (a) Money

    (b) Credits earned

    (c) Practicum

    (d) Others ______________________________

30. Do you know of other counseling centers who used S-S-C, and then discontinued it? Why?

    (a) Institution

    (b) Address

V. RESISTANCES/OPINIONS

31. How was/is S-S-C perceived by the following persons?

    (a) Dean?

    (b) Dept. chairman?

    (c) Colleagues in your dept.?

    (d) Colleagues in other depts.?

    (e) Graduate students/teaching assistants?

    (f) Other students in class(es)?

    (g) Any other?

32. Do you feel that the emphasis that your institution places on research and publication versus counseling effectiveness is about right?

33. Do you feel you are properly rewarded for being a good counselor, even if it interferes with your research and publication activities?

34. Has your counseling effectiveness been a help or hindrance in your academic career?

35. Does your dean or department chairman have data about your counseling effectiveness?

36. Do students fill out a counselor-evaluation form at your center which is sent to the dean or chairman?

VI. GRANT PROPOSAL WRITING

37. How did you decide to make a grant proposal to the Exxon Education Foundation?

38. Did anyone assist you in preparing your grant application?

(a) No one

(b) Research administration staff

(c) Department chairman

(d) Colleagues in the department

(e) Others ____

39. Do you feel that Exxon's limit of $6,000 was a serious limitation in making your proposal?

VII. PERSONAL DATA AND DIFFUSION ACTIVITIES

40a. How long have you been counseling at the college level?

40b. How long have you been teaching at the college level?

41. What conferences, workshops, and seminars on S-S-C have you attended?

42. How have you tried to spread the practice of S-S-C?

(a) Personal conversation/correspondence

(b) Given workshop

(c) Writing paper

(d) Others ____

43. Have you received/read Prof. Brown's literature on S-S-C?

    (a) What was most useful?

    (b) What was least useful?

    (c) What additional information would have been valuable?

44. Do you have suggestions for speeding the wider adoption of S-S-C?

45. What do you think are the ethical problems involved in using students as paraprofessional counselors?

Appendix F

CODING SHEETS FOR DATA FROM THE PERSONAL AND TELEPHONE INTERVIEWS

I. HISTORY/KNOWLEDGE

First Interest
Relv. Advant:
c-$-Pot:
Effcy:
Effect:
Size, Nat:
DOR:

N→ K→A:
Dissat:
K→N→A:
Innov. compt:
Δ→K:
Innov→Δ→+:

Ind vs. grp decision
Init:
Approv:
Coop:
Who else:
Total:

II. PLANS TO USE

Using:
When st:
Plan to use:
Month:
Year :
Course Name:
Level:
Total #:
Ext. Ut.:

VII. Grant Proposal Applicatio

Decision to make
Money:
Release time:
Assistance:
Total:
Exxon grant adeq:
Adequate:
Desired:
Other sources of funds:

III. Comput. Know. & Compata.

K comput program:
No. of comput lang:
Names of comput lang:
Req comput K:
Comput lang =Inv:
Comput make/model:
Comput netwk mem:
Comput cons mem:
Assisted by:

VIII. Personal Data & Diff Activ

Yrs. coll. tchg:
Conf w/c atten:
Efforts to Diffuse
Personal conv:
Writ. paper:
Other:

Summary Picture:

IV. Specific Inf. on Innovatio

Effort/time
No more than prev:
Lot more:
Gradually:
Less than prev. method:
Feedback vs. Eval (TIPS):
Improve Dec.Mkg abi (GD):
Expr. Desg. abi: (ES):

Modification:
Follow:
usg sub-inv version:

Rethk cour. obj:
Encourage:
Obj. prev:

V. Evaluative Data

Comparative $: Qualitative
More useful:
Saves time:
Init $↓→↑:
↑ Cost:
Fac. time:
Comput $:
Mat $:
Sec time:
Others:

Dist. Gains
Weaker stu:
Ave stu:
Better stu:

Peer tutorg:
Kp data:
Unit cost:

Quotes:

VI. Resistances and Opinions

Favorableness
Dean:
Chair:
Coll (dept):
Coll (univ):
Gra stu/TA:
Students:
Others:

Reward Structure
Tchg/Res-Pub:
Prop reward:
Teachg→ Help:

Tch Effective
Dean/Chairman:
T-Ev. form:

I. HISTORY/KNOWLEDGE

First Interest
Relv. Advant:
c-$-Pot:
Effcy:
Effect:
Size, Nat:
DOR:

N→ K→A:
Dissat:
K→N→A:
Innov. compt:
Δ→K:
Innov→Δ→+:

Ind vs. grp decision
Init:
Approv:
Coop:
Who else:
Total:

II. PLANS TO USE

Using:
When st:
Plan to use:
Month:
Year :
Course Name:
Level:
Total #:
Ext. Ut.:

VII. Grant Proposal Applicatio

Decision to make
Money:
Release time:
Assistance:
Total:
Exxon grant adeq:
Adequate:
Desired:
Other sources of funds:

III. Comput. Know. & Compata.

K comput program:
No. of comput lang:
Names of comput lang:
Req comput K:
Comput lang =Inv:
Comput make/model:
Comput netwk mem:
Comput cons mem:
Assisted by:

VIII. Personal Data & Diff Activ

Yrs. coll. tchg:
Conf w/c atten:
Efforts to Diffuse
Personal conv:
Writ. paper:
Other:

Summary Picture:

IV. Specific Inf. on Innovatio

Effort/time
No more than prev:
Lot more:
Gradually:
Less than prev. method:
Feedback vs. Eval (TIPS):
Improve Dec.Mkg abi (GD):
Expr. Desg. abi: (ES):

Modification:
Follow:
usg sub-in version:

Rethk cour. obj:
Encourage:
Obj. prev:

F-3

V. Evaluative Data

Comparative $: Qualitative
More useful:
Saves time:
Init $↓→↑:
↑ Cost:
Fac. time:
Comput $:
Mat $:
Sec time:
Others:

Dist. Gains
Weaker stu:
Ave stu:
Better stu:

Peer tutorg:
Kp data:
Unit cost:

VI. Resistances and Opinions

Favorableness
Dean:
Chair:
Coll (dept):
Coll (univ):
Gra stu/TA:
Students:
Others:

Reward Structure
Tchg/Res-Pub:
Prop reward:
Teachg→ Help:

Tch Effective
Dean/Chairman:
T-Ev. form:

Quotes:

I. HISTORY/KNOWLEDGE

First Interest
Relv. Advant:
c-$-Pot:
Effcy:
Effect:
Size, Nat:
DOR:

N→ K→ A:
Dissat:
K→ N→ A:
Innov. compt:
△→ K:
Innov→ △→ +:

Ind vs. grp decision
Init:
Approv:
Coop:
Who else:
Total:

II. PLANS TO USE

Using:
When st:
Plan to use:
Month:
Year :
Course Name:
Level:
Total #:
Ext. Ut.:

VII. Grant Proposal Applicatio

Decision to make
Money:
Release time:
Assistance:
Total:
Exxon grant adeq:
Adequate:
Desired:
Other sources of funds:

III. Comput. Know. & Compata.

K comput program:
No. of comput lang:
Names of comput lang:
Req comput K:
Comput lang =Inv:
Comput make/model:
Comput netwk mem:
Comput cons mem:
Assisted by:

VIII. Personal Data & Diff Activ

Yrs. coll. tchg:
Conf w/c atten:
Efforts to Diffuse
Personal conv:
Writ. paper:
Other:

Summary Picture:

IV. Specific Inf. on Innovatio

Effort/time
No more than prev:
Lot more:
Gradually:
Less than prev. method:
Feedback vs. Eval (TIPS):
Improve Dec.Mkg abi (GD):
Expr. Desg. abi: (ES):

Modification:
Follow:
usg sub-in version:

Rethk cour. obj:
Encourage:
Obj. prev:

V. Evaluative Data

Comparative $: Qualitative
More useful:
Saves time:
Init $↓ → ↑:
↑ Cost:
Fac. time:
Comput $:
Mat $:
Sec time:
Others:

Dist. Gains
Weaker stu:
Ave stu:
Better stu:

Peer tutorg:
Kp data:
Unit cost:

VI. Resistances and Opinions

Favorableness
Dean:
Chair:
Coll (dept):
Coll (univ):
Gra stu/TA:
Students:
Others:

Reward Structure
Tchg/Res-Pub:
Prop reward:
Teachg→ Help:

Tch Effective
Dean/Chairman:
T-Ev. form:

Quotes:

F-5

I. History/Knowledge

First Interest
Relv-Advant:
c-$-Pot:
Effcy:
Effect:
Size, Nat:
DOR:

N→ K→ A:
Dissat:
K→ N→ A:
Innv. Compat:
Δ →K:
Innov→△→+:

Ind. vs grp decision
Init:
Approv:
Coop:
Who else:
Total:

II. Plans to Use

Using:
When st:
Plan to use:
Month
Year
Level of Counselor:
Soph:
Jr:
Sr:
Other:

Size of Coun Unit:
# of stu rec coun:
Stu/counselor:

Location of counselor:
Residence hall:
Stu Soc center:
Stu Rel center:
Inst. Dept.
Study habit center:
Test & Coun center:

VI. Resistances and Opinions

Favorableness:
Dean:
Chair:
Coll (dept):
Coll (univ):
Gra stu/TA:
Students:
Others:

Reward Struc.
Couns/Res-Pub:
Properly Rew:
Counsl→ Help:

Effect:
Dean/Chair:
T-Ev form:

Summary Picture:

VII. Grant Proposal Application

Decision to make:
Money:
Release time:
Assistance:
Total:
Exxon Grant adeq:
Adequate:
Desired:
Other Sources of funds:

VIII. Pers. Data & Diff Act.

Yrs Coll tchg:
Conf w/a Atten:
Efforts to diffuse:
Personal conver:
Writ papers:
Others:

III. Counseling Exper:

Types of Coun Exper:
Prim/sec level:
College:
Other:

IV. Specific Inf. on Innovation

Modification
Follow:
Usg sub inv-ver:
Rethk cour obj:
encour:
obj-prev:
Types of Advisors:
Stu-Res Hall:
Fac Adv:
Acad Adv:
Other:

Training time:
Teacher:
Stu-couns:
Matr for stu-coun trg:
Tech used in trg:
grp disc:
lect:
demon:
rdg assn:
role play:
Practicum:

peer:
rating:
Other:

Areas of couns-stu couns
orient to sch:
per-soc prob:
study habits:
Religious:
edu prog plans:
vocational:
Psy test interp:
Others:

V. Evaluative Data

Compar. $: Qualit.
More useful:
saves time:
Init $↑→↓:
↑ cost:
Fac. time:
Mat $:
Sec time:
Others:
Unit Cost:

Dist. Gains
Weaker stu:
Ave stu:
Better stu:
Kp Data:

Compensation-coun:
$/Brd/Rm:
Credit:
Others:

Quotes:

Appendix G

SECONDARY RECEIVERS TELEPHONE INTERVIEW GUIDE

SECONDARY RECEIVER SURVEY

TELEPHONE INTERVIEW GUIDE

PART I

1. Have you heard about (innovation)?

_____ No

_____ Yes

2. When did you first hear about it?

Month _______________ Year _______________

SAME AS ORIGINAL QUESTION #3, BELOW.

3. When did you first hear about the innovation(s)?

__________ (Month) __________ (Year)

3. Where or from whom did you first hear about it? __________________

SAME AS ORIGINAL QUESTION #2, BELOW.

2. Where or from whom did you first hear about the innovation(s)?

- ☐ The IMPACT brochure from the Exxon Education Foundation
- ☐ Department Chairman
- ☐ Other administrator (e.g., dean, vice-president, etc.)
- ☐ A professional conference or seminar
- ☐ Journal articles (PLEASE SPECIFY: ____)
- ☐ Colleague in your field (PLEASE TELL US HIS NAME, DEPARTMENT, and INSTITUTION: ____)
- ☐ Other sources (PLEASE SPECIFY: ____)

4. Did you hear anything about this innovation from any other source?

____

5. We have recently contacted ____________________ from ____________________

__________________, who said that he had mentioned this innovation to you.

Do you remember this?

____ No (Go to question 12 if respondent HAS heard of innovation from other source; go to question 17 if he/she HAS NOT.)

____ Yes

6. Where did this occur? ____________________________________

7. How often did you discuss this innovation with ________________________?

____

8. What did he/she tell you about it? ________________________________

____

9. Did he/she adopt it himself/herself? ___ No ___ Yes

10. Did he/she urge you to adopt this innovation yourself?

____ No (Go to question 12).

____ Yes

11. What reasons did he/she give you for urging you to adopt this innovation?

____

____

12. After hearing about ________________, did you request any further information from ________________, the inventor?

____ No

____ Yes

12a. What were the most important reasons that prompted you to request information on the innovation?

____

____

SAME AS ORIGINAL QUESTION #4a, 4b, BELOW.

4. Have you requested further information about at least one of the four IMPACT innovations from Dana Main, Charles E. Wales, Allen C. Kelley, or William F. Brown?

☐ No

☐ Yes ------→

4a. (IF YES) Which innovation(s) have you requested information about?

☐ EXPER SIM (Dana Main)

☐ Guided Design (Charles E. Wales)

☐ TIPS (Allen C. Kelley)

☐ Student-to-Student Counseling (William F. Brown)

4b. (IF YES) What were the most important reasons that prompted you to request information about the innovation(s)?

(1) ______________________________

____

(2) ______________________________

____

(3) ______________________________

____

13. We would like to mail questionnaires to everyone who already knows about the innovation(s) and is interested in considering use of the innovation(s). To do this we need your help. With whom have you discussed the innovation(s)?

13a. Colleague(s) in your department or unit?

☐ No

☐ Yes ----→ (IF YES) Who? (PLEASE TELL US HIS NAME)

EXPER SIM: ______________________________

Guided Design: ______________________________

TIPS: ______________________________

Student-to-Student Counseling: ______________

____

13b. Colleague(s) elsewhere in your institution?

☐ No

☐ Yes ----> (IF YES) Who? (PLEASE TELL US HIS NAME AND DEPARTMENT)

EXPER SIM: ______________________________

____

Guided Design: ______________________________

____

TIPS: ______________________________

____

Student-to-Student Counseling: ______________

____

____

13c. Colleague(s) in other institutions?

☐ No

☐ Yes ----> (IF YES) Who? (PLEASE TELL US HIS NAME, DEPARTMENT, AND INSTITUTION)

EXPER SIM: ______________________________

____

____

Guided Design: ______________________________

____

____

TIPS: ______________________________

____

____

Student-to-Student Counseling: ______________

____

____

NOTE: QUESTION #13 APPEARED ORIGINALLY AS QUESTION #5 IN THE REQUESTOR SURVEY.

PART II*

1. Did you adopt ________________________ yourself?

____ No

____ Yes

2. When did you start using the innovation?

Month ________________ Year ________________

3a. Do you have specific plans to adopt ________________ during the academic year 1975-1976?

____ No

____ Yes

3b. What are the most important reasons for NOT adopting ________________?

____

QUESTION #1, 3a, AND 3b ARE SAME AS ORIGINAL QUESTION II-1, SEE COLORED SHEETS.

---

*Note: All questions in Part II were asked as in the Phase I requestor questionnaire, with the exception of question #2.

II. Now we want to ask you about EXPER SIM--a system for teaching research design through computer simulation--developed by Dana Main at the University of Michigan.

1. Have you adopted (that is, actually used) EXPER SIM?

   ☐ Yes

   ☐ No

   1a. (IF NO) Do you have specific plans to adopt EXPER SIM during the academic year 1974-75?

   ☐ No

   ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting EXPER SIM?

   ☐ Unavailability of trained personnel (e.g., teaching assistant, computer programmer, etc.) to implement

   ☐ Unavailability of funds to adopt

   ☐ Lack of support from administrators

   ☐ Overly time-consuming or lack of release time

   ☐ Does not fit the subject matter of your course(s)

   ☐ Your computer is not appropriate

   ☐ Lack of transferable computer programs

   ☐ Your doubts about the usefulness of computer-related instructional approach

   ☐ Students' attitudes toward computer-use

   ☐ Other (PLEASE SPECIFY: ____________________

   ____

   ____)

2. Have you used a computer for--

   2a. Research purposes

   ☐ No

   ☐ Yes

   2b. Teaching purposes

   ☐ No

   ☐ Yes

3. Do you have any suggestions for strategies to facilitate the implementation of EXPER SIM?

   ____

   ____

II. Now we want to ask you about Guided Design--a teaching method combining principles of programmed instruction with open-ended problem-solving--developed by Charles E. Wales at West Virginia University.

1. Have you adopted (that is, actually used) Guided Design?

   ☐ Yes

   ☐ No

   1a. (IF NO) Do you have specific plans to adopt Guided Design during the academic year 1974-75?

   ☐ No

   ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting Guided Design?

   ☐ Unavailability of trained personnel (e.g., teaching assistant, etc.) to implement

   ☐ Unavailability of funds to adopt

   ☐ Lack of support from administrators

   ☐ Overly time-consuming or lack of release time

   ☐ Does not fit the subject matter of your course(s)

   ☐ Unavailability of appropriate teaching materials

   ☐ Other (PLEASE SPECIFY: ____________

   ____

   ____________________)

2. Do you have any suggestions for strategies to facilitate the implementation of Guided Design?

____

____

____

____

II. Now we want to ask you about TIPS--a diagnostic tool to individualize instruction in the large class--developed by Allen C. Kelley at Duke University.

1. Have you adopted (that is, actually used) TIPS?

   ☐ Yes

   ☐ No

   1a. (IF NO) Do you have specific plans to adopt TIPS during the academic year 1974-75?

   ☐ No

   ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting TIPS?

   ☐ Unavailability of trained personnel (e.g., teaching assistant, computer programmer, etc.) to implement

   ☐ Unavailability of funds to adopt

   ☐ Lack of support from administrators

   ☐ Overly time-consuming or lack of release time

   ☐ Does not fit the subject matter of your course(s)

   ☐ Your computer is not appropriate

   ☐ Lack of transferable computer program

   ☐ Your doubts about the ability of multiple-choice questions to measure your course content

   ☐ Other (PLEASE SPECIFY: ________________

   ____

   ____)

2. What students do you think need the most help from a college teacher?

   ☐ Students with top grades

   ☐ Average students

   ☐ Students with poor grades

3. Do you think that TIPS would enable you to reach this group?

   ☐ No

   ☐ Yes

(OVER)

4. Have you used a computer for--

   4a. Research purposes

   - ☐ No
   - ☐ Yes

   4b. Teaching purposes

   - ☐ No
   - ☐ Yes

5. Do you have any suggestions for strategies to facilitate the implementation?

____

____

____

____

II. Now we want to ask you some questions about Student-to-Student Counseling--a systematic approach to training students as academic counselors--developed by William F. Brown at Southwest Texas State University.

1. Have you adopted (that is, actually used) Student-to-Student Counseling?

   ☐ Yes

   ☐ No

   1a. (IF NO) Do you have specific plans to adopt Student-to-Student Counseling during the academic year 1974-75?

   ☐ No

   ☐ Yes

   1b. (IF NO) What are the most important reasons for not adopting Student-to-Student Counseling?

   ☐ Unavailability of trained personnel (e.g., counseling assistant, etc.) to implement

   ☐ Unavailability of funds to adopt

   ☐ Lack of support from administrators

   ☐ Overly time-consuming or lack of release time

   ☐ Your doubts about the effectiveness of students as counselors

   ☐ Other (PLEASE SPECIFY: ____________________

   ____

   ____)

2. About how many students have received counseling services through your unit during the academic year 1973-74?

   ____________ students

3. How many years of college-level counseling experience have you had?

   ____________ years

4. Do you have any suggestions for strategies to facilitate the implementation of Student-to-Student Counseling?

   ____

   ____

   ____

   ____

III.* Finally, we would like to ask you something about yourself and your institution; this information will be held in confidence.

1. What is your highest completed degree?

   ☐ Bachelors
   ☐ Master's
   ☐ Specialist, or Master's plus about 30 credits
   ☐ Doctorate

2. What is your academic field of specialization?

   ____

3. What is your academic rank? (CHECK MORE THAN ONE, IF APPLICABLE)

   ☐ Instructor
   ☐ Assistant professor
   ☐ Associate professor
   ☐ Professor
   ☐ Department chairman
   ☐ Administrator (e.g., vice-president, dean, director of counseling center, etc.) (PLEASE SPECIFY:

   ____________________________________)

   ☐ Professional staff (e.g., grant coordinator, counselor, etc.) (PLEASE SPECIFY:

   ____________________________________)

   ☐ Other title (PLEASE SPECIFY: ____________________

   ____________________________________)

4. How many years have you been at your present institution?

   ____________ years

5. Did you teach at least one course during the past academic year 1973-74?

   ☐ No
   ☐ Yes ---→

   5a. (IF YES) What was the enrollment in the largest class that you taught?

   ______________ Students

---

*Note: All questions in Part III were asked as in the Phase I requestor questionnaire.

5. (continued)

5b. (IF YES) Did you use any of the following techniques in this course?

☐ No ☐ Yes Instructional TV and/or videotape

☐ No ☐ Yes Overhead projector

☐ No ☐ Yes Simulation, instructional games, and/or role-playing

☐ No ☐ Yes Contract grading

☐ No ☐ Yes Computer-assisted instruction

☐ No ☐ Yes Programmed instruction and/or other printed self-instructional materials

☐ No ☐ Yes Small group discussion

6. What is your sex?

☐ Male

☐ Female

7. What is your age?

____________ years

8. What relative weight is given to effective teaching, versus research and publication, when a faculty member in your unit (such as a department) is considered for a promotion or a raise?
PLEASE DISTRIBUTE 100 POINTS BETWEEN THESE TWO ALTERNATIVES, DISREGARDING COMMUNITY SERVICE AND OTHER RESPONSIBILITIES:

____________% Teaching

____________% Research and publication

9. Would you like to receive a summary of the results of this investigation?

☐ No

☐ Yes ----

9a. (IF YES) Please give your name and mailing address:

- -

Name: ______________________________

Mailing Address: ______________________

____

____

THANK YOU VERY MUCH FOR YOUR COOPERATION.